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Improved Sleeping Car.

To persons who have occasion to travel long railroad journeys by day and night, there is no greater luxury than a sleeping car. The horizontal position is the natural one for sleeping, and if this can be secured the accessories of a bed become insignificant. Many plans have been patented for constructing cars in such manner that the seats could readily be converted into beds, and some of the patentees have realized handsome incomes by running cars fitted with their convertible seats, letting the berths at fifty cents per night. We present an illustration of the latest of these improvements, which was invented among the Sierra Nevada Mountains of California, the inventor having constructed an elegant model there of brass and mahogany at a cost of more than $200, which he has brought to this city with a view of selling the rights either to some of our railroad companies, or to some enterprising operator in patent rights.

The principal advantages claimed for the car are the facility with which the seats can be changed to beds, and the perfection of both the beds and seats. The engraving represents two of the seats, A and B, as arranged for a bed, while the others are in the proper position to be occupied as seats.

The back of the seat, B, is suspended upon pivots, *c c*, so that it may be turned down to occupy the place of the bottom of the seat, and a portion of the space between the two seats, A and B. The remainder of this space is filled by the board, *d*, which turns down below the bottom of the seat. The space between the seats, B and C, is filled by the board, *e*, which forms the bottom of the seat.

In changing the seats into beds, the metallic support, *f*, is first swung around on its hinge from the front of the seat, B, to form a support for one end of the board, *e*, the opposite end of this board resting on a similar support which remains permanently in place between the ends of the seats next the side of the car. The front edge of the board, *e*, is then raised, drawing from its hole a dowel pin that holds the board in place, and the board is drawn forward into the position represented. The back is then turned upward to give room for the board, *d*, to be turned over into its position, when the back is swung down, filling the space between the boards, *d* and *e*. The back is made in two parts connected by a hinge joint, so that it may be leveled down from its curve when it is occupied as a bed.

This arrangement, besides the facility which it gives for changing the seats to beds, and *vice versa*, makes the seats reversible so that none of the passengers need to ride backwards, and completely separates the beds from each other.

The second tier of berths is formed in the most simple manner. A wide board or platform is carried during the day at the ends of the seats by the side of the car, standing upon its edge, and at night it is lifted over the seats into a horizontal position, where its outer edge is supported by shoulders on the posts, G G, while its inner edge is sustained by hooks catching into recesses formed for the purpose in the side of the car. Swinging handles are fastened to the under side of the platform for convenience in lifting it. The outer edge of the platform is supported by the wide rail, J, which performs the double office of stiffening the platform and keeping the sleeper from falling out of his berth. This rail is connected with the platform by a hinge joint, so that it folds down flatly upon the platform when the latter is removed.

The several boards or sections are softly cushioned so as to form sofa beds, and pillows are carried for the upper and lower berths in the boxes, H H, beneath the seats. The upper berths are completely separated by the headboards, I, which are attached to the platforms by hinges so as to fold down when the platforms are to be replaced in their positions. The upper berths may be arranged and occupied without disturbing the seats, thus allowing a portion of the passengers to sit up late if they choose to do so.

The principal object of this invention was the construction of a sleeping car so simple in its arrangement that it could be used without inconvenience or objection as an ordinary car, and could quickly and easily be altered by the passengers themselves into a sleeping car : thus dispensing with expensive attendance, and enabling railroad companies to furnish berths to night passengers without extra charge. The inventor hopes to find our railroad managers sufficiently disposed to encourage improvements, to be willing to give his car an examination.

The patent was procured through the Scientific American Patent Agency Oct, 23, 1860. For further information address the inventor, J. Hyde Fisher, at Chicago, Ill., or S. T. Weston, Placerville, Ca.

FISHER'S RAILROAD SLEEPING CAR.

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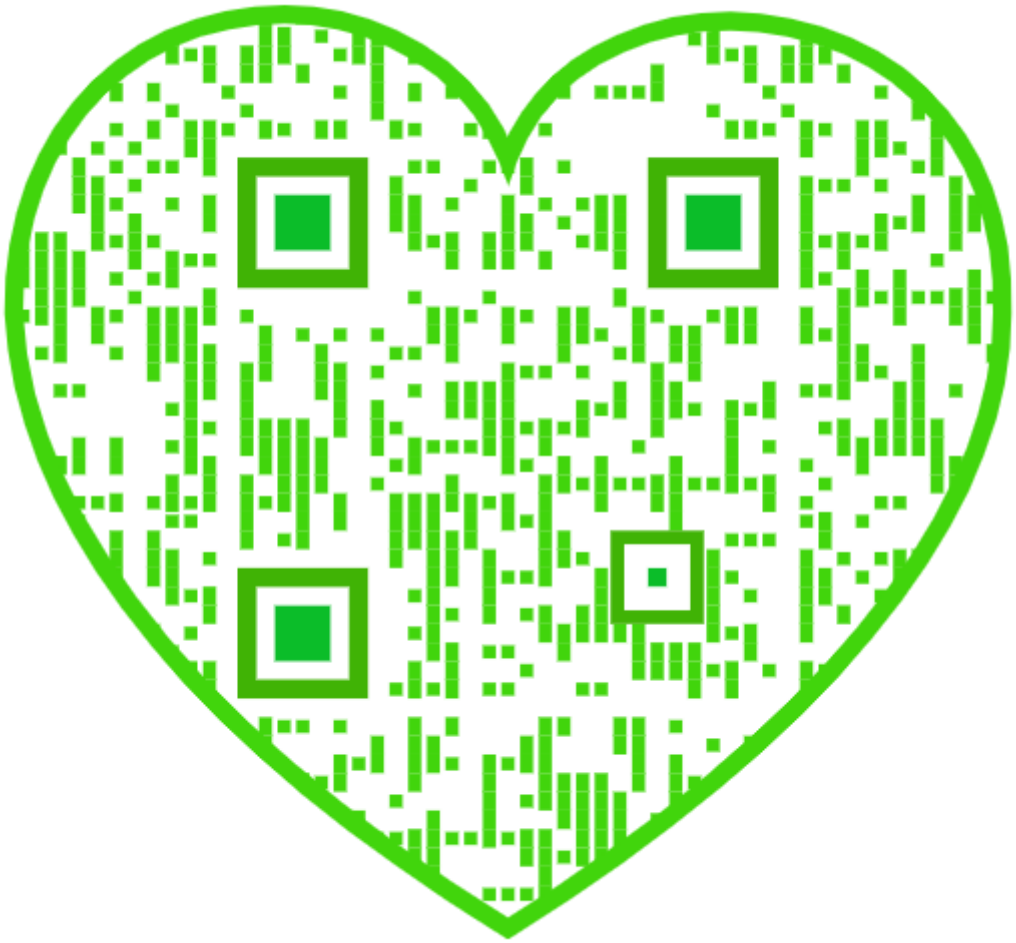

THE WAR.

No military movements of any importance have taken place since our last issue. The Mayor of Washington city has been arrested and sent to Fort Lafayette on a charge of treason, and a few treasonable journals—the *New York Daily News*, *Day Book*, *Journal of Commeree*, and some others—have been seized at the express offices as treasonable productions, and the Postmaster-General has interdicted their distribution by mail. A few newspaper offices through the country which were aiding the secessionists have also been destroyed by the people.

Governor Gamble, of Missouri, has issued a proclamation calling out the militia of the State to the number of 42,000, to repel and drive out the secessionists and restore order in that State.

In Eastern Tennessee, the secessionists are making progress in crushing down the Union sentiment of the people. Parson Brownlow's paper, which has so boldly sustained the Union cause in that section, has been suppressed. Government should at once protect these loyal people by a strong force.

The greatest activity prevails in all the navy yards and in most of the private ship yards, in building naval vessels and altering commercial steamers to adapt them to war purposes. Several of the gunboats recently contracted for have been launched, and there is no doubt that the blockade will soon be entirely effectual.

A NAVAL EXPEDITION FROM FOTRESS MONROE.

On Monday, Aug. 26th, an important naval expedition sailed from Fortress Monroe; its destination not being made public. The fleet consists of the frigates *Minnesota* and *Wabash* the sloop-of-war *Pawnee*, the gunboats *Monticello* and *Harriet Lane*, the steamers *Adelaide* and *George Peabody*, two propellers, and a large number of schooners, barges, and other small craft. The *Quaker City* was to follow in a few hours after the departure of the main fleet. The vessels carried over 100 guns and about 4,000 men Col. Max Weber's and Hawkins's Zouaves took part in the expedition.

Trial of the great "Union" Gun.

On the 22d of August the great 12-inch rifled cannon, carrying a shot weighing 423 lbs., was tried at Fortress Monroe for the first time. This gun is 16 feet in length, and it weighs 52,005 lbs. It was cast at Pittsburgh by Rodman's improved process. The firing was done under the charge of Lieutenant Baylor, of the Ordnance Department, and we are indebted to the correspondent of the New York *Tribune* for a very spirited description of the experiment. He says:—"All things being ready, the process of loading the gun was commenced. Sergeant Welch, at the head of his black battalion of gunners, had already cleared the decks, wheeled the monster so that his gage was over the waters, and arranged the platform or staging on which the men could stand and be up even with the muzzle. First, the swab, which two men insert, cleans the interior; then comes a man with a red flannel bag, filled with powder, on his shoulder; it is the cartridge; and the ramrod, worked by four men, sends it home. Then comes the process of getting the shot to its place, a mass of metal that four men carry with difficulty. It is first rolled into an iron cradle or wide strap, looped with a rope, through which a piece of strong wood, several feet long, is inserted. Thus slung, the men tug the shot up the steps of the platform, soms ten feet high, to the mouth of the gun. Another lift brings it on a level, and it is slid into the muzzle and pushed to its place. The gun is then elevated by means of an iron bar, the gun being nicely balanced on its trunnions. The priming wire performs its office, the fuse is inserted, and the lanyard is attached. Then Lieut. Baylor, who, though everything has been done under his minutest inspection, has moved about more like a modest spectator than the responsible director, gives warning that the gun has never before been fired, and moves a short distance to the rear, in which he is imitated by the others. The men who are to calculate the flight of the shot are at their table. The flag is up. The man with the lanyard retires to its extreme length. "Ready," says Sergeant Welch. Lieut. Baylor gives the word: "Ready—fire!"

A terrific crash, a sheet of flame, and the trembling of the earth follow. At the same time there is a screech and a scream caused by the shot, a black mass which you can see, in its flight, yelling like an infuriated devil let loose from the infernal regions. We count the seconds, and watch to see the shot strike. A column of water away off on the bay shoots up to the hight of a ship's mast. The elevation of the gun was but ten degrees, little more than blank shot, consequently the distance was not great, say two miles, the time of flight fifteen seconds. The terrible engine, the echoes of whose thunders have scarcely yet died away over the waters and along the shore, whose breath, a dark sulphurous cloud, floats before the wind—the thing which we would naturally associate with the idea of a glowing fiery monster the embodiment of all the furies, is next the object of attention. It is as passive as anything can be. The sergeant pats familiarly its massive smooth breech, the smoke curls slowly from the mouth of the chamber from which the 420-pound shot has just been vomited, and for the instant it is difficult to reconcile the crash, the flame, the trembling earth and the screech, with the thing that neither trembles nor glows nor makes other sign of its truly awful and almost supernatural endowments.

The next time a shell is fired at the same range, but it fails to explode. And here let me remark that both shot and shell seemed to be not the thing for the gun. The soft metal with which they were coated stripped and flew in all directions when only a few hundred feet from the gun, so that one might mistake the pieces for a charge of grape from a howitzer. The idea of filling the grooves and thereby obtaining a rotary motion must have been but imperfectly realized.

The gun was again loaded with a solid shot, and elevated twenty-eight degrees. This and the next shot, which was at the same elevation, were very fine features of the experiment. As you watched the progress of the shot, which in its circuit attained an elevation probably of not less than 800 or 1,000 feet, you might easily convince yourself that it was a wild, screaming, roaring monster, dashing through the skies, mad at the sun, or an affrighted spirit from the bowels of the earth seeking safety in the clouds. The range was about three and a half miles; the time thirty seconds.

Two shells with percussion fuse were then fired into a sand bank not more than 25 feet from the gun. The result gave some idea of what the gun would do against sand batteries. The sand was thrown in every direction, and the experiment seemed to prove that the shell accurately fired would undermine and destroy a sand battery quite as rapidly as a battalion of men with shovels. The shell burst into a great number of pieces, the parts found weighing but a few pounds.

The following is an analysis of the firing, for which I am indebted to Lieut. Baylor. It will be read with interest, not less by the public who have heard so much of the Big Gun, than by those who watch such experiments with a professional interest:

No. 1. Elevation, 10°; solid shot, weight 423 lbs.; cartridge, 42 lbs.: flight —— ; range, 3,512 yards.
No, 2. Elevation, 10°; shell, weight 352 lbs.; cartridge, 35 lbs.; flight, 12 seconds; range, 2,960 yards.
No. 3. Elevation, 28°; solid shot, weight 423 lbs.; cartridge, 42 lbs.: flight, 30 seconds; range, 5,877 yards.
No. 4. Elevation, 28°; shell, weight 351 lbs.; cartridge, 35 lbs.; flight, 29½ seconds; range, 5,040 yards.
No. 5. Elevation, 0; shell, weight 351 lbs.; cartridge, 35 lbs.; fired into sand bank.
No. 6. Elevation, 0; solid shot, 423 lbs.; cartridge, 42 lbs.; the same.

NATIONAL RIFLE ASSOCIATION—PRIZES OFFERED.

The loyal Americans now in England recommend President Lincoln to encourage the formation of a Volunteer Rifle Association upon the model of the one which has been in existence in Great Britain for nearly two years. They trust that the President, the Secretary of War and Lieutenant-General Scott will give the sanction of their names to the promotion of such an organization.

As a commencement, and for the purpose of inaugurating the first competitive tests in shooting with the rifle at a target, the loyal Americans in Europe tender four Whitworth rifles as prizes. These rifles have been ordered and are now being made, and they will be ready to send forward as soon as R. G. Moulton and R. B. Perry—the Committee of Correspondence, now in Manchester—are made aware that measures have been taken to form an American National Rifle Association.

The committee state that they are warranted in asserting that the Whitworth rifle is the best produced in England. Each prize will cost £25 ($124), and it is deemed that they will be very suitable prizes for the occasion. The loyal Americans in Europe have taken a most practical view of the subject,

The Phœnixville Ordnance Works.

The Navy Department has just ordered 300 guns from the Phœnixville (Pa.) Iron Works. The same number has also been contracted for by the War Department.

The process of manufacturing these guns is different from the old method of hammering The guns are rolled hollow by the following means: Beveled bars of iron are used to form the required pile or basework for the gun; the bars being beveled, leave a hollow in the center. These bars are placed side by side on a mandril. After the foundation of the gun is secured by bands, numerous bars of the best iron are wrapped spirally around it, running from end to end, so as to produce a sufficient thickness from which can be rolled a cannon of the caliber desired.

These bars are put on at a white heat, and when the white mass cools, it is put into a furnace, brought to a welding heat, and, at the same time, a piece of iron of sufficient size to form the breech is heated and forced into the end of the mass of iron.

The pile is then put into a machine which forces the ends together sufficiently to completely weld the edges of the bars of iron which have been previously wrapped around the foundation of the gun. After this process, the iron is passed through immense rollers until the whole is thoroughly welded, and of the desired size; now the trunnions are welded, or, technically speaking, "jumped" on. As soon as the guns cool they are put into a lathe, turned to a proper shape, and the hollow or bore of the gun bored to the desired size.

The advantage of wrapping the bars around the pile, instead of hammering it, gives it the full benefit of the tensile strain of the iron; while the other process only gives the strain that can be obtained from the cross section of the iron.

The first six guns that were made were thoroughly tested about two weeks since at Washington, and the Ordnance Department now desires other guns to be turned out as rapidly as possible.

On the trial of these guns, it was found that 4-pounders would throw a 10-pound shell or shot of the acorn pattern 2½ miles with accuracy, and the 6-pounders, 15-pound shot 3½ miles. They are used with great efficacy at point blank ranges of from 1,200 to 1,500 yards.

Two batteries of six guns each have been ordered for the city of Philadelphia, and it is said that some of our artillery companies have asked for these guns for their batteries.

Parson Brownlow's Card.

Parson Brownlow, editor of the Knoxvile (Tenn.) *Whig*, has battled nobly for the Union—but his labors as a journalist for the present are done. His paper has been suppressed by the Richmond government. In the last issue he thus speaks:—"So far as we are concerned, we can suspend our publication, in obedience to the dictates of tyranny and intolerance—we will yield to the demands of an armed mob—turn over to them our office and what little property we have—deprive ourselves and a helpless family of small children of the necessary means of support—and beg our bread from door to door among Union men who are able to give—but we shall refuse, most obstinately refuse, to the day of our death, to think or speak favorably of such a Confederacy as this, or to agree that honor, patriotism, or love of country, has influenced the men at its head, who have plunged the country into this revolution.

"And whether our humble voice is hushed in death—whether our press is muzzled by the spirit of intolerance at Richmond, making this our last issue of a journal we have edited for almost a quarter of a century, we beg all who may come after us and our paper, to credit no Secession falsehood that may represent us as having changed our principles from those of an exalted devotion to the old American Union, and of undying hostility to those who would perpetrate its dissolution!"

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Correspondence

The Great Exhibition of 1862.

Messrs. Editors :—What is our government going to do respecting the World's Fair, which is to be held in London next year? The British Commissioners appointed for that exhibition have advised our government that it is intended for the industry of all nations, and our artisans, inventors and manufacturers are respectfully invited to take part in the proceedings. and that a department will be set apart for them if arrangements are made in proper season. How has our government responded to the invitation? Several months have passed by since the subject was first presented, without active measures having been adopted to make arrangements by the appointment of a national commissioner. A few weeks more, and it will be too late for a proper organization of those who desire to become exhibitors, so as to have their arrangements completed and reach London in March next, in which month all articles are required to be entered. Congress has made a small appropriation for a commissioner, and it is so inconsiderable that it may be expected no mere politician or demagogue will be allured by it to use influence in obtaining the appointment. I trust that a capable and experienced commissioner will be selected. The Scientific American has already suggested the able Secretary of the New York State Agricultural Society, whose expenses will be paid by the society, if the general government fails to do so. I hope the President will appoint a commissioner at an early day, and one who will give character to the American part of the exhibition.

New York, August 26, 1861. H.

The Rumford Medals—Discoveries in Light and Heat.

Messrs. Editors :—I lately noticed in the *Tribune* an article calling the attention of the American Academy of Arts and Sciences to their breach of trust in the case of the Rumford medals. These medals were to be given biennially to the authors of the most beneficial inventions or discoveries in the field of light or heat, but they have been given but once in 65 years. As you are better posted on this subject than any one else can be, I would inquire of you if there have been any inventions or discoveries in optics or calorifics, or in any of the departments of science that may fall within the confines of light or heat, made within the last 65 years on the American Continent?

One of Many Inventors.

New York, August 23, 1861.

[We regret to state, that since Dr. Hare's great discovery of the oxyhydrogen light (now claimed as a new discovery under the name of "calcium light"), in 1808, no very important discovery, as far as we can recollect, has been made in light and heat, in America. A few years since, Mr. J. Frost, of Brooklyn, claimed the Rumford medal, and applied to the American Academy of Arts for it, in having discovered "stame" (steam heated apart from water), but it was refused. Several very important discoveries in light have been made by European scientists within a few years, but our American *savans* have done little or nothing of recent years to advance the science of heat and light. It is high time we were looking to our scientific laurels.—Eds.

The Big Guns at Pittsburgh.

Messrs. Editors:—In your issue of August 24th, I noticed an article quoted from a Cincinnati paper, giving an account of matters at the Fort Pitt Works in this city. The article describes a "huge 18-inch Columbiad revolving on a lathe," and speaks of "another 18-inch monster soon to be constructed." The Rodman gun (better known as the Floyd gun) was 15 inches in the base, and the Union gun only 12 inches. No 18-inch guns have ever been cast in this country.

The article also states that the works "are now turning out at the rate of nine rifled cannon per diem." Instead of such being the case, four or five per week is a fair average. B.

Pittsburgh, Pa., August 26, 1861.

About 2,000 lives are lost annually in the mines of Great Britain, by accidents.

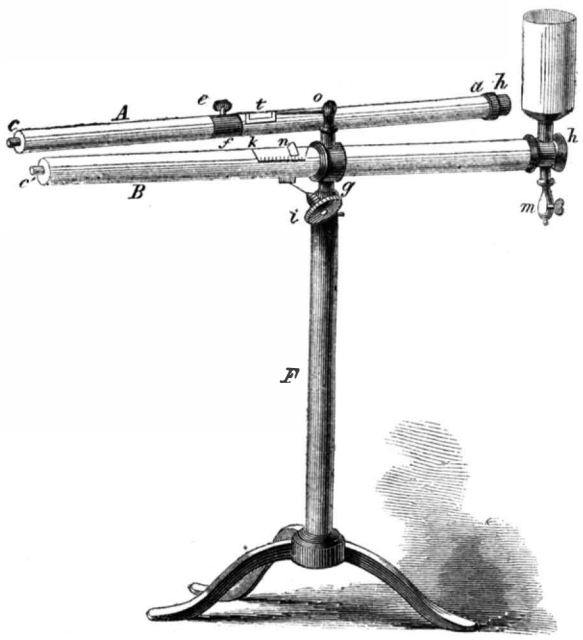
STAMMER'S IMPROVED CHROMOSCOPE.

[Translated for the Scientific American.]

The inventor of this ingenious and useful instrument, Dr. E. Stammer, describes the invention in *Dingler's Polytechnic Journal*, from which we give the following extract:—

The color of saccharine liquids and of raw sugars has heretofore been determined simply by estimate, because no instrument has been in existence by the aid of which the different colors could be accurately determined. To determine the decolorizing effect of boneblack or animal coal, such instruments as the "decolorimeter" of J. G. Greiner have been used now and then; but they have never, for various reasons, been introduced extensively.

To estimate the colors simply by observation with the naked eye is a very uncertain proceeding, since the colors of certain bodies are influenced by a great many circumstances; and even under the most favorable auspices, the colors of two bodies can only be compared, but the degree of difference between the two colors cannot be determined. For these reasons it has always been very difficult to form a correct judgment in regard to the efficacy of different processes or different methods of filtering generally employed in the manufacture of sugar in all such cases where the color is the criterion, and it has also been impossible to judge correctly the decolorizing power of different kinds of coal and other decolorizing agents.



The ordinary decolorimeter is arranged as follows: The liquid, after having been treated with the animal coal, the decolorizing effect of which is to be determined, is poured into a tube closed by a movable plug, while the original liquid is put into a closed tube of known length, and the hight of the column of the partly decolorized liquid necessary to produce the same color as the column of original liquid is compared with the hight of the latter. It is obvious that this apparatus can only be used to compare, by estimate, the effect of different decolorizing agents.

In order to be able to measure the color of saccharine liquids, a certain standard liquid is required, the color of which must be so selected that it allows of determining the degree of color of each solution with sufficient correctness, and its hue must be such that it allows of a comparison with all the different colors or hues occuring in saccharine liquids.

With this standard color, the colors of the different solutions are compared by bringing the latter into a tube of certain known length, and determining the hight of the column of the standard liquid to produce the same color. By means of these observations, the different colors can be expressed by figures with mathematical accuracy, and the decolorizing power of the different agents can be compared and determined without difficulty.

The two tubes which contain the two liquids are so arranged that both tubes can be observed with one eye, and their position can be changed from right to left, and *vice versa*, for it happens with almost every observation that the colors appear somewhat different when the position of the tubes is changed, and in such cases the mean figure from two observations must be taken.

The chromoscope is represented in the accompanying engraving, and its chief parts are the following :

1. The tube of observation, A, with the glass tubes, *a a*, of the respective length of one, two and four inches.
2. The measuring tube, B.
3. The standard color glass, *h*.
4. The compensating tube, D.

The tube of observation, A, is provided at that end turned toward the eye of the observer with an eye cup, *c*, and it contains on its other end either the standard color glass, *h*, or one of the glass tubes, *a a*, which fit it easily and nicely. These tubes correspond to the tubes of polarization instruments, and they can be used alternately with the latter, as occasion may require. The tube, A, is placed at an acute angle with the measuring tube, B, so that the observer is enabled, from a certain distance, to look simultaneously with one eye through both tubes. Said tube, A, is retained in the sleeve, *f*, by means of a set screw, *e*, and this sleeve connects by the horizontal arbor, *o*, and the vertical arbor, *g*, with the main part of the instrument. By these means, it is rendered easy to turn the tube, A, from one side of the measuring tube to the other.

The measuring tube, B, is provided with a piston operated by a pinion and toothed rack, in such a manner that, by the aid of said piston, the length of the column of the standard liquid can be changed at pleasure. The observation at this length is facilitated and rendered more accurate by the aid of a suitable vernier. The tube is closed at *h* by a disk of glass, and at the opposite end by a glass plate attached to the airtight piston. This piston is operated by the handle, *i*, and its motion is measured by the scale, *k*, which is read off at its front end by means of the vernier, *n*. The vessel, E, serves to receive the standard liquid, and the faucet, *m*, for the purpose of emptying the apparatus.

To enable the eye to look always into the same opening, a narrow tube is introduced into the movable end of the measuring tube, and into this tube an eye cup, *c'*, is inserted, similar to the eye cup in the tube of observation.

The standard color glass is secured in the collar, *h*; it serves to control the color of the standard liquid, and it is inserted at *a*.

The compensating tube, D, consists of a glass tube which can be closed up at both ends, similar to the remaining tubes, but of a smaller diameter. It is two inches long, and after removing the eye cup, *c'*, it can be inserted into the movable end of the brass tubes, in which case it acts in the place of the cup.

The entire apparatus revolves on a vertical arbor, which rises from the foot or standard, F. The standard liquid is prepared by mixing together different solutions of yellow, red and brown color, and it may be called "aqueous ulmic acid," from its principal ingredient. This liquid can be used to determine the colors of all saccharine liquids and sirups, and also of solutions of raw sugars, &c.; and the instrument may also be used with great advantage to determine the decolorizing effect of animal coal or other decolorizing agents.

For Guatemala.—The San Francisco *Mirror* states that the government of Guatemala is desirous of receiving American farmers, carpenters, blacksmiths, masons, and all classes of industrious artisans as permanent settlers, if they are willing to keep aloof from the political quarrels of the country. The cochineal crop, one of the staple products of Guatemala, has proved a failure for several years, and the people are now anxious to commence the cultivation of cotton, coffee and sugar.

The English government has invited proposals for the construction of three more iron-clad ships. They are each to be 400 feet long, 59 feet 3 inches beam, and will measure 6,620 tuns. They are to be entirely coated from stem to stern with iron plates 5½ inches thick, backed with 9 inches of teak, or to have plates 6½ inches thick without the teak backing, as the Admiralty may decide.

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The Bessemer Process of Making Steel.

We have endeavored to keep the readers of the Scientific American fully informed in regard to this great improvement. On page 32, Vol. XII. (old series), we gave an illustrated description of the process, and on page 373, Vol. III. (new series), an illustration of an improved reducing pot invented by Bessemer.

At a meeting of the Society of Mechanical Engineers at Sheffield, July 31 and August 1, Mr. Bessemer read an elaborate paper, giving a full account of the process, of the quality and properties of the steel, and of the uses to which it has been and may be put.

THE PROCESS.

It will be remembered that the process consists in filling a vessel with molten cast iron and forcing air into the bottom of it. The oxygen of the air combines with the carbon of the cast iron, producing carbonic acid, which passes off in the form of gas. This reduces the metal to pure malleable iron, and the proper amount of carbon is then introduced to form the quality of steel desired by adding pig iron containing a known quantity of carbon.

From Mr. Bessemer's paper we extract the following remarks in regard to the uses to which his steel may be applied.

USE FOR STEAM BOILERS.

With reference to the employment of cast steel for constructive purposes, there are few of more importance than its recent and successful application to the making of steam boilers. The Cornish boiler, as improved by Mr. Adamson, of Hyde, near Manchester, has a large flute tube constructed with narrow plates, which are over 12 feet in length, and flanged at each edge in a manner that, while it adds greatly to the stability of the tube, demands such qualities in the material employed for its manufacture as are only found in metal that has undergone fusion, and has become perfectly homogeneous throughout.

As a practical illustration of this mode of constructing boilers, and the powerful strains which the Bessemer steel is capable of sustaining safely, we may refer, by way of illustration, to the steam boilers employed for some time past at the works of Messrs. Platt Brothers, of Oldham, where six of these boilers are in daily use, their length being 30 feet, diameter of shell 6 feet 6 inches, diameter of flue tube 4 feet, thickness of plates $\frac{5}{16}$, working pressure 100 lbs. per square inch.

USE FOR ORDNANCE.

In pointing out a few of the more prominent and obvious applications of cast steel to constructive purposes it may be interesting to put on record one of its most special adaptations, the pursuit of which was, for the first year of the author's researches on iron, the sole object of his labors, and one that has, throughout the last six years, never been lost sight of by him. This object, it is almost needless to say, was the production of a malleable metal peculiarly suitable for the manufacture of ordnance

By means of the Bessemer process solid blocks of malleable metal may be made of any required size from 1 to 20 or 30 tuns in weight, with a degree of rapidity and cheapness previously unknown. This metal can also, with the utmost facility, be made of any desired amount of carburation and tensile strength that may be found most desirable. Commencing at the top of the scale with a quality of steel that is too hard to bore and too brittle to be used for ordnance, the metal can with ease and certainty be made to pass from that degree of hardness by almost imperceptible gradations downward toward malleable iron, becoming, at every stage of carburation, more easy to work and more and more tough and yielding, as the quantity of carbon is reduced, until it, at last, becomes pure decarbonised iron, possessing a copperlike degree of toughness not found in any iron produced by puddling. Between these extremes of temper the metal most suitable for ordnance must be found, and all are equally cheap and easy of production.

From the practice now acquired of forging steel ordnance at the works of Messrs. Bessemer and Co., it has been found that the most satisfactory results are obtained with metal of the same description as that employed for making piston rods. With this degree of toughness the bursting of the gun becomes almost impossible, its power of resisting a tensile strain being at least 15 tuns per square inch above that of the best English bar iron. Every gun before leaving the works has a piece cut off the end, which is roughly forged into a bar 2 inches by 3 inches in section, and bent cold under the hammer. In order to show the state of the metal after forging several test bars, cut from the ends of guns recently forged, will be found on the table. The power of this metal to resist a sudden and powerful strain is well illustrated by the piece of gun-muzzle before us. It is one of several tubular pieces that were subjected to a sudden crushing force at the Royal Arsenal, Woolwich, under the direction of Col. Eardley Wilmot. These tubular pieces were laid on the anvil block in a perfectly cold state, and were crushed flat by the falling of the steam hammer. Neither of the tubes so tested exhibited any signs of fracture. Perhaps the best proof of the power of such metal to resist a sudden and violent strain was afforded by some experiments made at Liege, by order of the Belgian government, who had one of these guns bored for a 12 lbs. spherical shot, and made so thin as to weigh only 9cwt. 1qr. 6 lbs. This gun was fired with increasing charges of powder, and an additional shot after each three discharges, until it reached a maximum of 6 lbs. 11½ oz. of powder, and eight shots of 12 lbs. each, the shots being equal to about one-tenth of the weight of the gun. It stood this heavy charge twice, and then gave way at about one metre from the muzzle of the gun, probably owing to the jamming of the shots. It is needless to state that the employment of guns so excessively light and charges so extremely heavy, would never be attempted in practice.

It may afford some idea of the facility of this mode of making cast steel ordnance when it is stated that the 18-pounder gun before us having been made for the author's private experiments on gunnery, he was present, and noted the time employed in its fabrication. The molten cast iron was tapped from the reverberatory furnace at 11.20 A. M., and converted into cast steel in thirty minutes, the ingot being cast in an iron mold 16 inches square by 4 feet in length. It was forged while still hot from the casting operation. By this mode of treating ingots the central parts of them are sufficiently soft to receive the full effect of the hammer. At 7 P.M., the forging was completed, and the gun ready for the boring mill. The erection of the necessary apparatus for the production of steel by this process, inclusive of the air pumps and steam-engine on a scale capable of producing from crude iron enough steel to make forty of such gun blocks per day, will not exceed a cost of £5,000. Hence the author cannot but feel that his labors in this direction have been crowned with entire success, the great rapidity of production, the cheapness of the material, its strength and durability, all point to its obvious adaptation to the construction of every species of ordnance.

OTHER USES.

To the practical engineer enough has been already said to show how important is the application of cast-steel to constructive purposes. A dozen new uses for it will present themselves to his mind, now that he is shown how this valuable material may be both cast and forged with such facility, and at a cost so moderate as to produce, by its superior durability and extreme lightness an economy in its use, as compared with iron. The construction of girders, bridges, and viaducts are all subjects deserving his careful attention and study. The author was long ago impressed with the importance of its employment for engine shafts, cranks, screw propellers, anchors, and railway wheels, which, indeed, formed the subjects of separate patents, granted to him six years ago; and to these special applications of cast steel the intelligent engineer will now add a host of others equally novel and important, for the author feels assured that the manufacturer of cast steel has only to produce, at a moderate cost, the various qualities of steel required for constructive purposes to ensure its rapid introduction, for we may be assured that, so certain as the age of iron superseded that of bronze, so will the age of steel reign triumphant over iron.

PHOTOGRAPHY IN PARIS.—A recent Paris census gives no less than 33,000 persons as connected with the production of photographs and photographic materiels! If photography deprived tens of persons in the shape of inferior miniature painters of a subsistence, it has manifestly provided employment and incomes for thousands of persons in their places.

A Hippopotamus Fight.

M. du Chaillu, in his work on his African explorations, gives the following account of a fight between two hippopotami which he witnessed:—

They are very combative among themselves, and bear marks on their bodies of desperate conflicts. * * * The young males suffer particularly in these encounters, as they are much imposed upon by the grown males, who are jealous of them. * * * It was my good fortune once to be witness to a combat between two hoppopotami. It occurred in broad daylight. I was concealed on the bank of the stream, and had been for some time watching the sports of a herd, when suddenly two huge beasts rose to the surface of the water and rushed together. Their vast and hideous mouths were opened to their widest extent, their eyes were flaming with rage, and every power was put forth by each to annihilate the other. They seized each other with their jaws: they stabbed and punched with their long tusks; they advanced and retreated; were now at the top of the water, and again sank down to the bottom. Their blood discolored the river, and their groans of rage were hideous to listen to. They showed little powers of strategy, but rather a piggish obstinacy in maintaining their ground, and a frightful savageness of demeanor. The contest lasted an hour. It was evident that their tusks could not give very dangerous wounds to such thickly-protected bodies as theirs. At last one turned about and made off, leaving the other victorious and master of the field.

My observations lead me to believe that in general the hippopotamus will not wantonly attack a canoe passing on the river. They either do not seem to notice it at all, or else avoid it by diving under water. They are troublesome beasts, however, to the traveler paddling along in a frail canoe, for they are very apt to rise suddenly under a boat and throw it over, to their own alarm, as well as to the inconvenience and danger of the passengers. In some instances, the huge beast becomes desparate from fright, thinks himself attacked, and with great rage demolishes the canoe. But even in such cases I have not heard of their ever touching the swimming passengers, who have only to keep away from the canoe to make sure their escape. * * * The negroes who hunt the hippopotamus are sometimes killed. The animal, if only wounded, turns most savagely upon its assailant.

There is now on exhibition at Barnum's Museum, in this city, a living hippopotamus, the only one ever brought alive to this country.

Extensive Steam Expansion.

A patent has recently been taken out by D. Adamson, of Newton-moor, England, for improvements in steam engines, which are stated to consist in using steam through a series of steam cylinders, of not less than three, when high pressure steam is employed, as in non-condensing engines, but the patentee prefers to use four cylinders and upward when condensing apparatus is applied. The steam is caused to pass through each cylinder consecutively, commencing at the cylinder having the smallest area, and passing forward to the next in proportion to the whole series. The action of the steam in each cylinder is regulated by valves, as in the case of an ordinary compound steam-engine having two steam cylinders.

THE PACIFIC TELEGRAPH.—The telegraph line now being put up to connect the Pacific with the Atlantic States is progressing satisfactorily. The *Alta Californian* states that if no accident happens to the teams employed in the work, the western half of the overland line between San Francisco and Salt Lake will be in working order before the first snow falls in the valley. On the eastern side, the line is up to Julesburg, 200 miles west of Fort Kearney. A large number of men and teams are now employed on this work, which is one of great magnitude. As fast as the line is put up, an operator puts it in speaking connection with the depot in San Francisco, and every day finds him occupying a new station, like a wandering Arab.

NOVA SCOTIA GOLD.—We have lately seen a sample of gold quartz from Tangier river, N. S., with a sample of its gold assayed by Dr. Gesner, of this city. The gold, we are told, is 988-1,000ths in purity, and worth nearly $20 per ounce. Quite a number of persons have gone to these gold diggings, and as this province is known to abound in coal, iron and other valuable minerals, it has become of still greater importance by the discovery of the precious metal.

IN 1860, the mines of Great Britain produced 90,680,000 tuns of minerals and coals, valued at £26,404,459. Total value of the entire mineral produce of Great Britain in 1860, exclusive of stones and clay, £37,121,318.

WHEN spongy platinum, or finely-divided platinum, is introduced into a vessel containing mixed hydrogen and oxygen gases, the metal becomes red hot, and the gases inflame and unite, chemically forming water.

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MANUFACTURE OF PAPIER MACHE.

It is the general belief that the Japanese were the inventors of *papier mâché*, and that the first articles of this substance which found their way into Europe were brought from Japan by the early Portuguese voyagers. Whether this is true or not, it is now well known that the Japanese still surpass all nations in the manufacture of various articles made from paper, and *papier mâché* has been a common manufacture of that empire from time immemorial. Although articles of this substance were first brought to Europe from the East, the art of making them was not; it was discovered in France without any knowledge of it being derived from abroad except by an examination of the articles which had come from Japan. This re-discovery was made about two centuries ago, and since that time it has been extensively copied by other nations, especially England, in which it is carried on in several places.

The following is a description of the manufacturing processes (taken from the London *Ironmonger*), as practised at the works of Messrs. Leveridge and Shoolbred, at Wolverhampton :—

There are at present five principal varieties of *papier mache* known in the trade, viz., 1. Sheets of paper pasted together upon models; 2. Thick sheets or boards produced by pressing ordinary paper pulp between dies; 3. *Fibrous slab*, which is made of the coarse varieties of fiber only, mixed with some earthy matter, and certain chemical agents introduced for the purpose of rendering the mass incombustible; a cementing size is added, and the whole well kneaded together with the aid of steam. The kneaded mass is passed repeatedly through iron rollers, which squeze it out to a perfectly uniform thickness; it is then dried at a proper temperature; 4. *Carton pierre*, which is made of pulp or paper mixed with whiting and glue, pressed into plaster piece-molds, backed with paper, and, when sufficiently set, hardened by drying in a hot room; 5. *Martin's Ceramic papier mache*, a new composition, patented in 1858, which consists of paper pulp, rosin, glue, drying oil, and sugar of lead mixed in certain fixed proportions, and kneaded together; this composition is extremely plastic, and may be worked, pressed, or molded into any required form. It may be preserved in this plastic condition for several months by keeping the air away, and occasionally kneading the mass.

The first mentioned variety of *papier mache* alone engages our attention here. A special kind of paper, of a porous texture, is manufactured for this purpose. An iron mold of somewhat smaller size than the object required is greased with Russian tallow, a sheet of the paper is laid on to the greased surface of the mold, and covered over with a coat of paste made of the best biscuit flour and glue, which is spread evenly all over the sheet with the hands, another sheet is then laid on, and rubbed down evenly, so that the two sheets are closely pasted together at all points. After this the mold is taken to the drying chamber, where it is exposed to a temperature of about 120°; when quite dry, which it takes several hours to accomplish, it is carried back to the pasting-room, and another sheet laid on with another coat of paste, after which it is returned to the drying chamber, and the same operation is repeated over and over again until sufficient thickness is attained, which for superior articles, such as are manufactured at these works, requires from thirty to forty sheets of paper, and of course, as many coats of paste between. The shell is then removed from the mold, and planed to shape with a carpenter's plane, after which it is dipped in linseed oil and spirits of tar to harden it; this changes the color from gray to a dingy yellowish-brown tint. The article is then stoved, and seven or eight coats of varnish are laid on (with a stoving after each), which are cleared off each time, any inequalities of surface being finally removed with pumice-stone. The number of drying processes the articles have to go through consume so much time that it takes three or four weeks to fit them for ornamentation, which is applied in bronze-powder, gold or color, and for many articles also in mother-of-pearl. The ornamentation of these articles is sometimes effected in the highest style of the painter's art. It was in Wolverhampton that Bird, R. A., worked as a "japanner,"—the technical name given to an "ornamentor:" and we believe some other of our great artists have sprung from the pursuit of this occupation.

The gold-leaf is laid on with a solution of isinglass in water, the design then penciled on with asphaltum, the superflous gold removed with a dossil of cotton dipped in water, which leaves intact the parts touched with asphaltum, and the latter finally removed with essence of turpentine. The cotton pledgets used are of course carefully collected, to recover the gold removed by them.

After the application of every coat of color or varnish, the object so colored or varnished is dried in an oven or chamber, called a stove, and heated by flues to as high a temperature as can safely be employed without injuring the articles, or causing the varnish to blister. All articles so japanned, or, to use the technical term, "stoved," are more durable than they would be if simply left to dry in the air.

For black grounds, drop ivory-black mixed with dark colored animé varnish is used; for colored grounds, the ordinary painter's colors, ground with linseed oil or turpentine, and mixed with animé varnish. The colors most in use are white lead, cobalt-blue, yellow, vermilion (used more particularly to imitate tortoise-shell), Indian red, verdigris, umber, and the intermediate tints produced by mixing two or several of them together. The varnishes most used are animé and copal. The grounds and varnishes are generally laid on with painting brushes, or flat brushes, made of fine soft bristles. Tin-plate articles intended for japanning, are first thoroughly cleansed from every trace of grease that may adhere to them, with turpentine or spirits of tar, then rubbed with sand-paper. They are then ready to receive the first coat, after which they are thoroughly dried in the stove.

For black japanned works, the ground is prepared with a coating of black made as just now stated, by mixing drop ivory-black with dark colored animé varnish, which gives a blacker surface than would be produced by the japan alone; and the object is then dried in the stove; from three to six coats of japan are afterwards successively applied, the work being always thoroughly dried again in the stove ovens between the laying on of every fresh coat.

For brown japanned works, umber is mixed with the japan to give the required tint, the process in all other respects being the same as for black japanned works.

The colors are protected against atmospheric influences, and made to shine with greater brilliancy, by two or three coats of copal or animé varnish. Superior articles receive as many as five or six coats of varnish, and are finally polished.

The ornamentation of all such articles as come under the head of Toilet Wares, is effected by the ordinary mode of painting with the camel's hair pencil, or some fitting substitute; where imitations of woods or marble is intended, the ordinary grainer's tools are used. Many patterns are produced upon the various articles by "transfer printing."

As it regards the burnished and *dead* parts of the gilding they are finished in the same manner as those on japanned articles of tin ware.

Several coats of shellac varnish are now put on, and the article is placed in an oven which is heated to about 280° Fah., after which it is polished with rotten stone and oil and brought to a brilliant surface by hard rubbing.

Designs in mother-of-pearl are laid on with black varnish, the article is then varnished all over, dried, then rubbed down over the design with pumice-stone; another coat of varnish is then laid on, dried, and the part covering the design again rubbed off with pumice-stone, and thus several coats are laid on until all the surface is level with that of the design. Ornamental lines, writing, &c., are laid on with color. The inlaying with mother-of pearl is a laborious business, owing to the small size of the pieces at the artist's disposal, and the necessity of attending to a proper distribution and fitting of lights and shades. Some of the most elegant articles for household decoration are now made of *papier mâché*. Tables, chairs, work-boxes, tea-trays, portfolios, screens, &c., of this substance, molded into graceful forms and ornamented in the highest styles of art, adorn the mansions of the opulent. The English artists are inferior to the French in executing designs with mother-of-pearl. The French are neat, and have the good taste not to over-ornament; English artists frequently mistake profusion for true ornament.

Manufacture of Rifled Cannon.

[From the Troy Times.]

It was stated a few days since that Messrs. Corning, Winslow & Co., of Troy, proprietors of the lower works at the Nail Factory, had obtained a large contract for the manufacture of steel rifled cannon for the government. This was a mistake. Messrs. C., W. & Co., have a contract for making only two cannon for the government, both of which are steel rifled guns, of the Rodman patent, and are now nearly finished. This enterprising firm, however, anticipating the demand which would be made for steel rifled cannon, and aware of the immense resources of their establishment for turning out this class of work, have recently undertaken to construct several cannon upon a new and improved plan, and in the event of their success, of which there can be scarcely a doubt, tender the use of their extensive works to the government for the manufacture of as many of these improved arms as may be desired.

The inventor of this new and doubtless most effective ordnance weapon is a civil engineer, named Juan Patterson, an intelligent and scientific man, who has spent much time in the study of gunnery. He superintends the construction of the cannon, the process of which is exceedingly interesting. The steel is manufactured in the mill of Messrs. Corning, Winslow & Co., from the best of pig iron, which, by a process known only to the workmen in this establishment, is converted into a superior article of steel when the iron is being molten in the furnace. So remarkable is this processes in its operations, that the best workmen, unacquainted with the fact, would be unable to determine whether the heated mass he saw before him was really undergoing this delicate operation of being converted from one kind of material into another, as there is nothing by which he could detect the change. After the steel is withdrawn from the furnace, it is placed under an immense trip-hammer, weighing three tuns, and there formed into solid pieces, called "blooms," weighing from 900 to 1,700 pounds. The utmost care is exercised to bring the material out in the most perfect shape, and an apparently insignificant check or flaw in the edge of the bloom is sufficient to cause its rejection by the critical operator in charge of this department. The blooms are next placed under a smaller trip-hammer, where they are reduced to the size and appearance of a rough cannon. Next, they are turned off in the lathe, and subsequently drilled, rifled and polished.

One of the new Patterson cannon, which is termed the "Excelsior," is nearly completed, and will be experimented with at West Point some day next week. The cannon is six feet long, and throws a six-pound conical iron ball. The barrel is grooved, and has a revolving twist once in forty inches. Mr. Patterson informs us that the range of the gun is increased by the increased ratio of the twist, and that where the Whitworth cannon has a twist of once in thirty-six inches, his obtains a greater range from being increased to once in forty inches. The symmetry of the gun is perfect, and in this respect it is certainly a much more beautiful weapon than any we have ever seen. The breech of the piece runs parallel twenty-one inches to the trunnion, when it gradually tapers off to the termination at the muzzle. The balls are cast with projections fitting to the grooves of the barrel, with a recess in the base for a band of leather to surround it, which is made, by means of a screw press, to fit the bore precisely, and this being covered with a slight coating of lead, prevents any abrasion or injury to the gun in firing. The cannon weighs about seven hundred pounds, and is calculated to possess a range of 3½ miles. A longer and heavier piece, of the same pattern, also nearly finished, is calculated to throw a ball six miles. The bore of the gun is about three inches in diameter, and the thickness of the barrel one inch. The cannon has been put to every trial possible to explode it, but the material has withstood all the tests that could be applied to it.

Mr. Patterson has invented a new and very ingenious means of firing the piece by means of a friction tube or lock set in the *cascabel* of the gun. The cascabel instead of being permanently attached to the breech of the piece is set into it by means of a screw, and thus in reality the bore extends the entire distance of the gun, so that when the cascabel is taken off one can look directly through the gun. By means of a spring, the cap is exploded by the lock, and the gun discharged. The advantage of this means of discharging an ordnance piece of this character by a lock set into a detached cascabel, is, that in case it is necessary to retreat in an action, and the gun cannot be brought off, the lock can be unscrewed in an instant and be carried away. The gun is thus disabled, and cannot be turned upon the retreating body. Spiking a gun in such an event is entirely unnecessary in Mr. Patterson's mode of firing it. The piece is directed by an elevated sight in discharging it, and exact range is obtained for any practical distance by simply moving the sight up or down.

An experiment, as we have said, is shortly to be made with these guns. A practice target, such as is used at West Point, has been made, and consists of a piece of canvas about twenty feet square, marked off into sections or squares, with black paint, with the center indicated by a good-sized circle. This target is placed upon an iron frame, and set off the required distance. We shall await the issue of the experiment with no little interest, believing that the result will prove every way satisfactory to the inventor, and to the gentlemen who are aiding him in perfecting his enterprise.

Some interesting relics have been recently dug up at Pompei. Among these was a thick golden ring with a precious stone, bearing a figure of Hercules, armed with a club, and engraved by the artist Sonoles, a cotemporary of Augustus, and whose name is marked in minute letters. A full-size female head of bronze with glass eyes, and bronze inkstand with a lid, and a sponge inside, still in good preservation, were also discovered, with a number of coins, and several curious buckles of gold.

To Make Hens Lay.—A correspondent of the *Prairie Farmer* says:—"I send you a recipe for making hens lay: Take some oats and boil them until soft; then fry them in hot fat, and you will have any quantity of eggs."

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USEFUL INFORMATION ABOUT PATENTS AND PATENT LAW CASES.

There are questions constantly being put to us by our correspondents touching the legal rights of inventors and patentees. These questions are of a multiform character, and ofttimes involve matters of great importance to those interested. We present herewith a great variety of topics which we have no doubt will interest and instruct all who are in any way concerned in inventions and patent property. The information is mostly based upon the patent laws and decisions made in accordance therewith.

SALE OF INVENTIONS PRIOR TO THE ISSUE OF PATENTS.

The question is often asked : "Can an invention be publicly used previous to the application for a patent without invalidating the claim after the Letters Patent are issued?" We answer *yes*. By the provision of the act of 1839, it is decreed that "no patent shall be invalid by reason of such purchase, sale, or use prior to the application for a patent as aforesaid, except on proof of abandonment of such invention to the public, or that such purchase, sale, or prior use has been for more than two years prior to such application for a patent." This is a humane provision, as it may often happen that, at the time the invention is made, the inventor may not be in circumstances sufficiently affluent to enable him to apply immediately for the patent, or he may desire to make some experiments for the purpose of testing the probable value of his invention.

Inventors, however, should carefully avoid reposing too much confidence in this provision, as the same section of the law thus cited provides that "every person or corporation who has or shall have purchased or constructed any newly invented machine, manufacture, or composition of matter, prior to the application by the inventor or discoverer for a patent, shall be held to possess the right to use, and vend to others to be used, the specific machine, manufacture, or composition of matter so made or purchased, without liability therefor to the inventor or any other person interested in such invention."

NATURE OF A CAVEAT.

A caveat is a confidential communication made to the Patent Office, and is therefore filed within its secret archives. The privilege secured under a caveat is, that it entitles the caveator to receive notice, for a period of one year, of any application for a patent subsequently filed, and which is adjudged to be novel, and is likely to interfere with the invention described in the caveat ; and the caveator is then required to complete his application for a patent within three months from the date of said notice. Caveat papers should be prepared with great care. The government fee is $10.

Caveat papers cannot be withdrawn from the Patent Office after they are filed, but additions may be made thereto, by sending them to the Office ; and the privilege enjoyed under a caveat may be renewed at the end of the year by the payment of another fee of $10.

THE INVENTOR MUST APPLY FOR THE PATENT.

It is necessary, in all cases, that an application for a patent should be made *in the name of the inventor*.—In all cases the applicant must swear that he believes himself to be the original and first inventor of the improvement for which a patent is asked. He must also state under oath, the name of the country or government to which he belongs. The object of this statement of citizenship is to enable the government to apply the discriminating clause of the law in respect to fees, in certain cases. The inhabitants of all countries whose patent laws do not discriminate against Americans, may obtain patents here upon the same favorable terms as our own citizens. [See rates of fees in another column.]

The required oath of invention may be made, in foreign countries, before any United States Consul.

RIGHTS OF MINORS.

A minor can take a patent in his own name, but it is subject to the control of one of his parents or his legal guardian, the same as any other property that may come into his possession ; and when an assignment of an invention or patent is mode by a minor, the consent of the parent or guardian should be duly inscribed upon the deed of transfer.

Women can also apply for and obtain patents upon the same terms as the sterner sex. We frequently take out patents for ladies ; but they do not exercise their ingenuity as much as they ought.

CURIOUS QUESTION ABOUT OWNERSHIP IN PATENTS.

Many employers think themselves entitled to all inventions made by persons in their service. This is not so unless there is a stipulation to that effect ; and it is high time that employers should abandon such unjust pretensions. No inventor need fear of thus losing his right, unless it can be proved that he was employed expressly to bring out such invention for the benefit of his employer. This fact may or may not apply to an invention made by a slave ; his *status* is, we understand, about to be legally determined.

PRELIMINARY EXAMINATIONS.

The United States Patent Office at Washington contains nearly 30,000 models pertaining to patented inventions, all of which are open to public inspection and examination, together with the drawings and specifications relating thereto. But the distance of the capital and the time and expense involved in a journey thither deters, in effect, the majority of inventors from reaping the advantages which a personal examination of previously patented inventions might oftentimes give them. To obviate this difficulty we are in the habit of making these examinations at the Patent Office for inventors. When it is desired to ascertain definitely whether an invention, believed to be new, has been previously made, or to what extent, if any, it has been anticipated, the applicant sends to us a rough sketch and description of the device. We then make a thorough examination in the Patent Office at Washington, and report the result to the applicant. The charge for this service is only $5 ; and it is frequently the means of saving the applicant the entire expense of preparing a model, paying government fees, &c., by revealing the fact that the whole or a material portion of his improvement was previously known. This preliminary examination is sometimes also of importance in assisting to properly prepare the papers, so as to avoid conflicting with other inventions in the same class. The reader should carefully note the distinction made between this preliminary examination at the Patent Office and the examination and opinion given at our own office, either orally or by letter, for which no fee is expected. It is only when a special search is made at the Patent Office that the fee of $5 is required. We are able, in a vast number of cases submitted to us, to decide the question of patentability without this special search.

PATENT FEES.

By the new law of 1861, the following rates of fees for patents are established :—

On filing each caveat	$10
On filing each application for a patent	15
On issuing each patent	20
On application for re-issue	30
On application for an extension	50
On the granting an extension	50
On application for a design patent of 3½ years	10
On application for a design patent of 7 years	15
On application for a design patent of 10 years	30

ASSIGNMENTS.

An inventor may sell and assign all his right, title and interest in an invention prior to the application for a patent, or subsequently, as desired. But no assignment can convey to the purchaser the right to apply for the patent in his own name. The petition and specifications must be signed by the inventor, and no attorney or other substitute will answer, except in case of death, when the heir or administrator may sign.

When it appears to the Commissioner that a full assignment of the invention has been made prior to the application, he will issue the patent to the purchaser as assignee of the inventor.

It should be borne in mind, however, that the Letters Patent cannot issue to the assignee for only a moiety or part of the invention. Neither can the Letters Patent issue to assignees in cases where an inequality of interest exists ; for instance, where one party has one-fourth and the other has three-fourths. To secure the issue of the patent to an assignee or assignees, he must hold the full and undivided right to the same.

There are three classes of assignments that must be recorded at the Patent Office within three months from their date, in order to insure their validity against subsequent purchasers without notice. These are, first, an assignment of the entire patent ; second, of an undivided portion of a patent ; third the sale of an exclusive right, under a patent for a particular territory

Illustration : If A, having already sold a patent to B, turns knave and makes a second sale of the same property to C, who records it, (B having omitted to place his assignment on record within three months, and C having no knowledge of the sale to B,) then the assignment to C will be held valid, and that to B becomes null ; B's only remedy being a suit for fraud against A.

We are very frequently asked the following question : "A, B and C each own an undivided third-interest in a certain patent. Can A proceed to manufacture and sell the patented article whenever he chooses, without the consent or without accounting to B and C as to the proceeds ?"

In answer we say that A can proceed, without consent, to manufacture and sell the patented article whenever he pleases. Whether B and C can procure an order from the Court compelling A to give bonds that he will account for profits and set apart a third share thereof to each, under the direction of the Court, is a question as yet undecided.

If an assignment of the invention is made at the time of the application, and the case is rejected after examination, and the inventor or his attorney afterward succeeds in securing the issue of the patent, by appeal or otherwise, this issue does not, as some have supposed, render the transfer invalid.

STAMPING PATENTED ARTICLES.

To prevent all misconception of the duties of patentees in regard to placing stamps upon patented articles we here copy a section of the law of 1861, which embraces the whole subject :—

SEC. 13, *And be it further enacted*, That in all cases where an article is made or vended by any person under the protection of Letters Patent, it shall be the duty of such person to give sufficient notice to the public that said article is so patented, either by fixing thereon the word patented, together with the day and year the patent was granted : or when, from the character of the article patented, that may be impracticable, by enveloping one or more of the said articles, and affixing a label to the package, or otherwise attaching thereto a label on which the notice, with the date, is printed ; on failure of which, in any suit for the infringement of Letters Patent by the party failing so to mark the article, the right to which is infringed upon, no damage shall be recovered by the plaintiff, except on proof that the defendant was duly notified of the infringement, and continued after such notice to make or vend the article patented. And the sixth section of the act entitled "An act in addition to an act to promote the progress of the useful arts," and so forth, approved the twenty-ninth day of August, eighteen hundred and forty-two, and the same is hereby, repealed.

QUESTIONS ABOUT THE USE OF PATENTED INVENTIONS.

It seems to be a disputed question with many persons, whether a petent for an invention prevents a man from imitating it merely *for his own private use*, so long as he does not sell it. We answer, it certainly does. A patent is an exclusive privilege, granting to the patentee, for the term of fourteen years, the right to *make*, vend, and use, and to sell to others the same rights and privileges ; therefore no one has any right to use a machine on his individual account. If this were not so, many patents would be entirely worthless, such as those for bridges and other structures or machines, which could be used by corporations, manufactories, &c., and the whole catalogue of manufacturing processes would thus become of no value.

The question is often asked : "Suppose John Brown owns the right of a patented invention for the State of New York, and John Smith, for the State of Pennsylvania. Then suppose a resident of New York goes into Pennsylvania and there purchases one of the machines thus patented. Now, can the latter individual carry it into the State of New York and use it without liability to John Brown ?" We answer *no*. John Smith can sell as many machines as he pleases, to all who come upon his territory to purchase them ; but the purchaser would be liable to damages if he used that machine in any State for which the right was owned by another party. The same remark applies also to the rights for towns and counties. The owner of such a right may take an order to make a machine from another town or county, but he must not sell it there ; and the person whom he supplies cannot use the machine without the consent of the licensee of his own county.

CAN A PATENT BE ATTACHED?

This is an important question. It is contended by some that, as a patent is granted to a person specified in the instrument for his exclusive use and benefit, no court or power of government can deprive him of it unless he assigns it, and without his assignment the mere possession of the document is as so much waste paper. Lawyers engaged in ordinary civil suits

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have confused this subject very much for want of proper knowledge on this subject. Some years since we took the advice of an eminent counsel on patents, resident in this city, who gave it as his opinion that, by a proper process of law, a patent can be attached and sold like other property. Curtis, in his able work on patents, referring to the same subject, says :—"The interest in a patent may also be assigned by operation of law, in case of the bankruptcy of the patentee, as well as by his voluntary assignment. There is no question that a patent already obtained passes to assignees in bankruptcy."

REJECTED APPLICATIONS.

When papers are unskillfully prepared, or when an invention is found to have been wholly or in part anticipated, the Commissioner of Patents is compelled to reject the application. The applicant is notified of the rejection by an official letter, which cites briefly the reasons—in one case, requiring a better specification or drawing, or, in the other, referring him to other similar inventions, either patented, rejected, or otherwise known. Applicants, or their attorneys, who live at a distance, are of course unable to examine into the references and reasons given for the rejection; so that, in most cases, they are in the dark as to whether they have been wholly or only partially anticipated; or if an error has been made in the papers, they are equally uncertain as to the proper mode of correction.

We furnish the following letter as an example of cases, badly prepared, that are constantly being placed in our hands, for the purpose of being straightened up and conducted to a successful issue :—

"UNITED STATES PATENT OFFICE,
June 30, 1858.

SIR :—The specification and one drawing of your * * are herewith returned, to enable you to furnish a specification which shall more definitely and fully state the construction and operation of your alleged improvements. The claim should be more definite, and should contain the words "substantially as herein above described," or words to that effect. Your oath is not in proper form.

Respectfully, yours, &c.,
J. HOLT, Commissioner."

We purposely omit the name of the invention, as well as that of the applicant. It pertains to an application for a patent which was prepared by a lawyer who, though probably well versed in legal lore, possessed no knowledge or facilities for doing patent business. His client's specification was consequently botched-up, and the application was rejected until proper papers should be filed.

THE BOARD OF APPEALS.

An applicant for a patent, if his case is rejected, is entitled to a re-examination and a hearing before the Examining-officer; and if again rejected, he may appeal to the Examiner-in-Chief, or a body composed of three Examining officers, who give a hearing, review the case, receive arguments, and then report to the Commissioner their views as to the propriety of granting the applicant's petition. The Commissioner awards a patent or finally rejects the case accordingly. A further appeal may be taken from the decision of the Examiners-in-Chief to the Commissioner of Patents, on payment of an extra fee of $20. From the decision of the Commissioner another appeal may be carried to one of the Judges of the United States Court, on payment of still another fee of $25. The applicant files his reasons of appeal; the Commissioner answers them and produces all the papers before the Judge; the latter hears argument, *pro* and *con*, and renders a decision, setting aside or confirming the ruling of the Commissioner.

PRIORITY OF INVENTION.

The fact that a patent has been granted is not full evidence that the patentee was the first inventor. If another individual comes forward, applies for a patent, and proves that he invented the thing prior to the discovery thereof by the existing patentee, then the Commissioner of Patents will issue a grant to the second applicant. Two patents will thus exist for the same invention, the first of which, if not voluntarily abandoned by the holder, will, by due process of law, be adjudged invalid.

INTERFERENCE.

When two different persons simultaneously apply for a patent for the same invention, or when a second inventor asks a patent for a thing already patented by another, the Commissioner of Patents will, either on his own volition or on request of the applicant, declare that *interference* exists; whereupon the Commissioner issues a notice to all the parties concerned, calling upon them to produce testimony, within a specified time, as to their respective dates of invention. This is done by witnesses, examined on behalf of the parties before any judge, justice or other officer qualified to administer oaths. The opposing party has the right to appear and cross-examine the witnesses in person or by counsel. The Commissioner awards the patent to whoever proves priority of invention.

In determining priority of invention, a variety of points are often to be taken into consideration. If the invention was experimentally shown at a prior date, but abandoned, such fact will not be conclusive proof of priority against a subsequent applicant who has gone steadily forward, and brought the invention into useful operation. Nor will the mere suggestion of the thing at a prior date, nor the mere drawing of the same upon paper, always be received as conclusive of priority.

The circumstances which may affect the decision of the Commissioner are various, so that skill and experience on the part of the attorney who examines or cross-examines the witnesses is very desirable. After the testimony is submitted, the parties have the right to put in written arguments in support of their cases, reviewing the evidence, citing law points, &c.

The proper preparation of these arguments requires a knowledge of previous decisions in similar cases, and a thorough acquaintance with the law, rules and practice of the Patent Office. Attorneys who are inexperienced in patent business should never undertake to manage interferences.

ABANDONMENT.

After the expiration of two years from the date of a patent, it is then too late for a subsequent applicant to come forward and, by proving priority, receive a patent. In such cases, the Commissioner of Patents holds that the prior inventor, by permitting the public exposure for two years at the Patent Office, of a model and drawings of the invention, without setting up any claim to the invention, has virtually abandoned the improvement, and is not entitled to the protection of the law.

ANNULING OF PATENTS.

The Commissioner of Patents has no power to annul an existing patent. He can order an interference to be declared between an existing patent and a pending application for a patent for the same invention, and then require testimony from each party in order to substantiate the question of priority of invention. If this is proved by the applicant for the pending case, the Commissioner exercises the right to grant the second patent. The evidence produced in the examination would confer a *prima facie* right upon the successful party.

RE-ISSUES.

The Patent Office is sometimes more adverse to the first granting of a patent with a broad claim than it is to allow the inventor to increase his claim by a *re-issue*. It also sometimes happens, after the first issue of a patent, that the claim is not as broad as the inventor is entitled to; or it happens that an infringer, by some peculiar quibble, renders it doubtful whether, from the wording of the original claim, the patent would be fully established on a trial at law. To meet such cases, as well as to correct any mistakes that may appear in a patent, the law provides for a re-issue of the document, with a new specification, new drawings, new claims, &c. It has become quite common for the holders of valuable patents, when infringed, to obtain a re-issue, before a suit is brought, with claims so worded as squarely to meet the infringer. In other cases where parties are using an invention without infringing, because not then covered by the claim of the patent, it is a practice to have the grant re-issued, with a claim that will render any further use an infringement. In such cases, users are generally willing to pay the patentee liberally rather than stand a suit at law.

Again: where the manufacture of a particular device is *intended* to be commenced, a re-issue is sometimes obtained as a measure of intimidation.

The owner or assignee of a patent has the same right to apply for and obtain a re-issue as the original patentee. The government fee, payable on applying for a re-issue, is $30. The fees of attorneys for preparing and conducting such cases are exceedingly variable. Our limited space forbids further discussion on the subject. Those who are desirious of obtaining re-issues are invited to correspond with us. We have had much success in cases of this character.

USING PATENTED DEVICES AFTER EXTENSION.

The benefit of an extended patent inures solely to the original inventor and patentee, or to his legal representatives. An assignee for the first term of the patent only, cannot exercise any right or interest under the extended patent. This question has been determined by a decision of the U. S. Supreme Court. Assignees, however, who were using patented machines at the time of the extension, still possess the right to use the same specific machines under the extended term of the patent, but this right does not cover the manufacture of new machines or their sale to other persons.

The language of the law on this point is as follows: "And the benefit of such renewal shall extend to assignees and grantees of the right to *use* the thing patented to the extent of their respective interests therein." This clause obviously permits only the using of the invention according to the interest in it, which is the *machine* and nothing more.

LICENSE LAWS OF STATES.

With a view to protect their own manufactures, certain of our States have passed laws regulating the conditions upon which goods may be sold by itinerating merchants and peddlers within their limits. Persons interested in the sale of patented articles have often supposed that these laws could not prevent them from selling such articles, as, otherwise, the law would conflict with our United States patent code, which gives to patentees and their assignees the exclusive right to make, use, and sell their inventions in all States and Territories within the jurisdiction of the United States Supreme Court. In this opinion they are evidently mistaken, as each State exercises the right to decide *what* shall be sold, and *how* it shall be sold, within its borders. Therefore peddlers of patented articles cannot sell them in any State where such laws exist, without obtaining a license from the proper authorities.

RIGHTS OF CITIZENS WHO HAVE REMOVED FROM THE UNITED STATES.

It not unfrequently happens that natives of the United States remove to the adjoining provinces, and remain there without taking any legal measures to discover their former political connection. Sometimes inventors have applied to us to know what rights they possess under such circumstances. The following opinion from the United States Attorney-General will enable all to decide for themselves how far removal has affected their citizenship. He says :—

"There is no statute or other law of the United States which prevents either a native or a naturalized citizen from severing his political connection with the government, if he see proper to do so, in time of peace, and for a purpose not directly injurious to the interests of the country. There is no mode of renunciation prescribed. In my opinion, if he emigrates, carries his family and effects with him, manifests a plain intention not to return, takes up his permanent residence abroad, and assumes the obligations of a subject to a foreign government, this would imply a a dissolution of his previous relations with the United States, and I do not think we could or would afterward claim for him any of the duties of a citizen."

MODELS.

The law requires that the inventor shall, in all cases, furnish a model, which must not exceed twelve inches in any of its dimensions; it should be neatly made of hard wood or metal, or both, varnished or painted; the name of the inventor should be engraved or painted upon it conspicuously. Where the invention consists of an improvement on some known machine, a full working model of the whole will not be necessary. It should be sufficiently perfect, however, to show with clearness the nature and operation of the invention. The proportion of parts, or scale on which a model is made, is a matter of no importance. As soon as the model is is ready, it should be carefully boxed and shipped, by express or otherwise, to our address, viz.: MUNN & Co., 37 Park Row, New York City. Prepay the expense, and send express receipt to us by mail.

A CORRESPONDENT of the London *Chewical News* says that the cause of the inferiority of the sulphuric acid manufactured in England at the present day is the almost universal use of pyrites.

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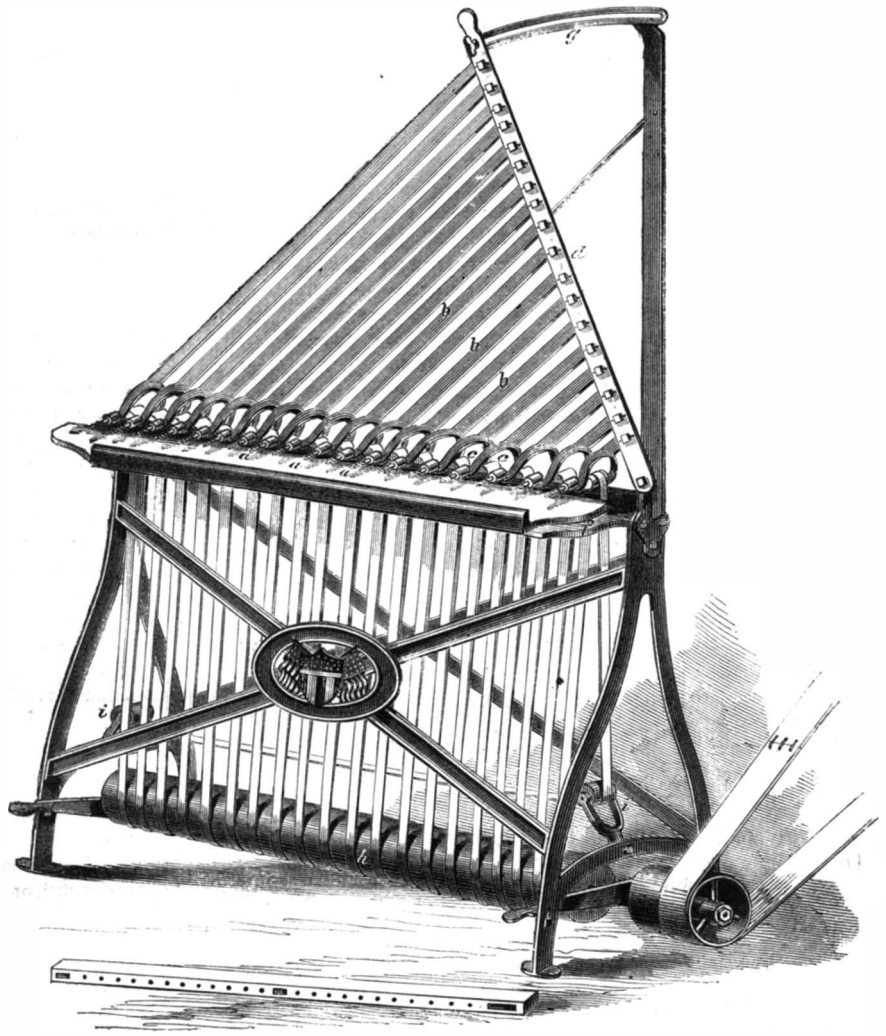
Improved Boring Machine.

The accompanying engraving represents a machine for boring bars of wood, or drilling bars of metal with holes at equal distances apart; especially suitable for boring the stiles of window blinds. It was invented by Eli P. Drake, of Greenbush, N. Y., and the invention has been assigned to P. H. Wemple, a practical sash, door and blind manufacturer of Albany, who has built some of the machines, and we have his testimony that they operate in the most satisfactory manner. The construction of the machine will be readily understood by examining the engraving.

The boring bits, *a a a*, have their journals in the lower ends of the bars, *b b b*, which are forked so as to embrace the pulleys, *c c c*, by which the bits are turned upon their axes. The upper ends of the bars, *b b*, are connected by pivots with the bar, *d*, and their lower ends rest upon two parallel ways, *e e*, upon the back edge of the table, *f*, the belts to drive the bits passing between the ways, *e e*, and around the pulleys, *c c*. The bar, *d*, is connected at its lower end with the frame of the machine and its upper end traverses along the stationary arc, *g*, and it will be seen that by moving its upper end along this arc, the distance apart of the bits can be varied at pleasure, while these distances still continue all equal to each other. Thus the tedious labor of spacing the stile is avoided. The stile or rod to be bored is laid upon the table in front of the bits and pressed up against their ends, thus boring all the holes at one operation. The bits are all driven by one belt which passes over each pulley and then around the drum, *h*, and passing finally around the return pulleys, *i i*.

If all of the bits are not required, the supernumerary ones are reversed in their position, and are thus put out of the way.



DRAKE'S BORING MACHINE.

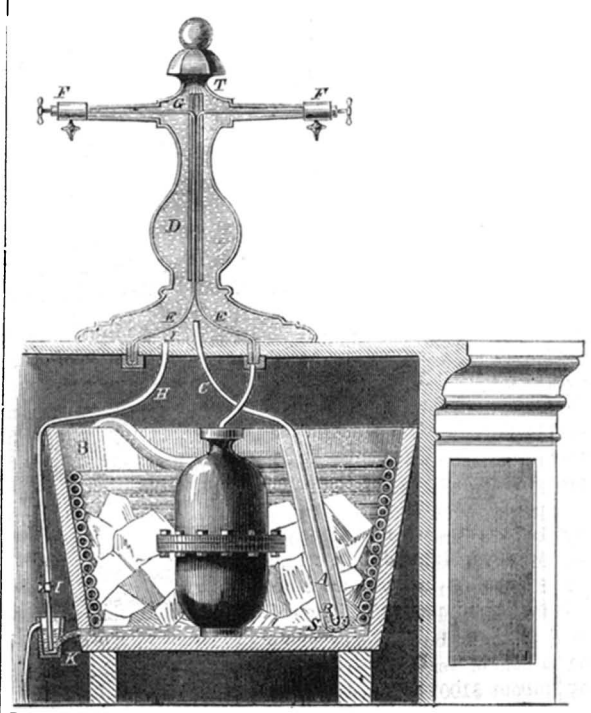
The patent for this invention was granted April 23, 1861, and further information in relation to it may be obtained by addressing P. H. Wemple, at 19 Norton street, Albany, N. Y.

NICHOLS'S IMPROVED SODA COOLER.

There has for a long time been a failing in the ordinary draught apparatus of the soda counter, from the fact that there would necessarily be two feet at least, and sometimes more, in length of pipe for soda water to pass through, after leaving the cooler, to the discharge. The consequence is, that the portion of water contained in the two feet or more of pipe would be at or near the temperature of the surrounding atmosphere itself; the next immediately passing would absorb the heat from the draught, and the water would be found at 50°, or even higher, in the glass, although it started at 33° or 34°; and the dealer would find (in order to insure each glass being properly cooled) it necessary to draw off and throw away nearly one glassful for each one sold. Of course, this trouble is found a serious drawback to either the profits or reputation of the counter. Often the dealer would not suspect the cause of their customers getting an unsatisfactory glass of soda, the cooler being well supplied with ice.

This difficulty seemed greater even in the more valuable ones than in the smaller. Soda water, in most cases, is drawn at intervals of from ten to fifteen minutes. To overcome this failing is the object of the "Perpetual Draught Cooler" here illustrated. A is the draught tube; B, the usual cooler beneath the counter. By pipe C, which is the short leg of a siphon, the ice water is carried up through pipe D, inclosing pipes E E, which convey the soda water to F F, filling space G, which forms the upper part of the long leg of the siphon; the water passing into pipe H, at I, through stopcock S, into regulating cup K, and thence out through waste pipe L.

The end of the siphon being always under the surface of the water in the cooler, it follows that the water in the cooler can only be drawn to the same level, remaining stationary at that point until a fresh portion of ice is supplied. R is a strainer on pipe C; and S, a protector from the ice. At T is a joint for readily cleansing the inside of the draught tube, if necessary.



The whole is readily filled up by a small elastic syringe applied at the lower end of pipe H.

By this method, all the water fresh from the melting ice is caused to flow steadily through the draught, varying in amount with the warmth of the weather.

The work of the apparatus being not to cool the water, but simply to preserve the temperature at which it leaves the cooler, its adaptation will be apparent, particularly when it is considered that ice water is about 32°, many degrees colder than the average soda water drawn.

Over those draught tubes consisting of a coil of pipe in a cylinder, and filled with ice, it has several advantages.

Only one cooler is used; it does not require extra attention; does not take the room of a refrigerator on the top of the counter between the customer and the person drawing.

It is applicable to any design, however irregular; does not require extra ice. The only cooler being under the counter, ice does not require breaking in small pieces.

It is applicable at a small expense to most all of the draught tubes now in use, many of which are of the most costly patterns.—The self-regulating quality makes it an almost perfect regulator of the ice water in the cooler, and, as only one accustomed to the charge of a soda counter knows, if the water accumulates in the cooler beyond a proper point, the soda water will pass through imperfectly cooled.

For economically cooling sirups, the ice water, after passing through the draught tube, is made to circulate through a metal case in which the sirup is kept or the bottom of the bottles are placed. The casing can be attached to many of the sirup vessels now used with pumps, or be made to take the place of ice in sirup coolers.

Water can be taken directly from the cooler where it is not desired for the draught tube, as in case where a draught cooler is already in use. By this method, the sirups can be kept many degrees below their usual temperature without extra expense except the small one for the apparatus in the first place, which will commend it particularly in those parts of the country where ice is scarce or commands a high price.

Draught tubes, with the Perpetual Cooler, can be obtained at John Matthews's manufactory, corner of First avenue and Twenty-sixth street, New York city, where one can be seen in operation. Mr. Matthews will also apply it to tubes which are in use

For rights to manufacture, &c., a line addressed to F. Nichols, New London, Conn., will meet with prompt attention.

A French Four-Pounder—The French four-pounder is so light and easy to handle that it superseded cavalry at the battle of Magenta, in which the Austrians were, as every body knows, pursued in their flight by the artillery. Since the campaign of Italy, the French army has been provided with a four-pounder still lighter, throwing the same projectile an equal distance and transportable on horseback. This cannon weighs only 233 pounds, and may follow the infantry in all places and positions it may be called to occupy. It is simply an application of the oriental jingal' still used to an extent in some parts of the East Indies.

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VOL. V. NO. 10.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 7, 1861.

INFORMATION AS TO THE PATENTABLE NOVELTY OF INVENTIONS.

The list of claims published from week to week in these columns, indicate truthfully the extent of business being transacted at the Patent Office.

It will be observed that inventors are far from being dormant, if they are not as numerous and active, as they were a year ago. Since the first of July we have received a great accession to our subscription list of new subscribers, and for the information of each, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplating securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a drawing and description or a model of the invention should accompany the remittance. Address—

MUNN & Co., No. 37 Park-row, New York.

WHALES AND FLINT.

It is well known that flint occurs in nodules or globular masses scattered through beds of chalk, and the origin of these nodules was long a mystery. But the microscope has unraveled it. On grinding down a piece of flint to an exceedingly thin lamina, and placing it under the microscope, it is found to consist of organic matter, spicules of sponges and valves and fragments of an organism that has been the subject of a great deal of discussion, the order of diatoms or diatomaceæ.

If we take a small drop of water from almost any stagnant pool, drop it upon a thin plate of glass, cover it with another thin plate, and place it under a compound microscope, we shall find it filled with little green crescent-shaped organisms, so small as to be entirely invisible to the naked eye, and swimming about in their tiny pond on the glass. These belong to the order of diatomaceæ, which embraces many other kindred forms of microscopic organisms. The name comes from the Greek *dia* (through) and *temeo* (to cleave), from the fact that those forms which grow in clusters may be easily cut or broken through. For the same reason they are called "brittle worts." Ehrenberg, the father of microscopy, called them animals, but nearly all the English and American microscopists regard it as entirely settled that they are vegetables. One of our importing merchants—Mr. Edwards—before he embarked in mercantile pursuits, devoted several hours a day for more than ten years of his life to the study of the diatomaceæ.

It is found that a diatom is a simple cell covered with an exceedingly thin scale of silex, which is the principal ingredient of flint. In some portions of the ocean these minute vegetables are found in inconceivable multitudes, and they form the food of soft, jelly-like moluscous animals. Some of these mulusca, as the salpadæ, roam through the ocean in such countless hosts that the water is sometimes found to be thick with them for *many degrees* of latitude.

The salpadæ feed upon the diatoms, and whales upon the salpadæ. The mass of the diatoms is digested in the stomachs of the salpadæ, but their silecious envelopes are almost wholly indestructible. They pass through the stomachs of the salpadæ, and through the stomachs, arteries, veins and intestines of the whales, without injury. When they are dropped in fæcal pellets by the whales, if these pellets happen to fall upon a broken mass of coral which is hardening into a bed of chalk, the soft mass closes over them, and they become a nodule of flint! In the process of time, the chalk bed is heaved up from the bottom of the ocean by the force of the internal fires, the chalk is quarried from the cliff, the flint nodules are extracted and broken up to be fitted into the locks of muskets, for the purpose of enabling human beings to blow the souls out of each other. Thus, in the course of long ages is the destiny of the ancient diatom fulfilled.

ROYAL AGRICULTURAL SOCIETY FAIR—STEAM PLOWING.

The annual exhibition of the Royal Agricultural Society, England, was held at Leeds from the 15th to the 19th, inclusive, of last month. There were 145,329 visitors on the grounds, 1,027 entries, and the receipts amounted to about $50,000. The great features of this exhibition were trials of agricultural engines and implements. Eight steam plows were tried in competition on four successive days, and on soils of different degrees of stiffness. Out of the eight plows there were three distinct classes; viz., Fowler's, which operates with its engine stationed at one end of the field, moving the plows by a wire-rope passing over pulleys on stakes. This engine winds up the endless wire-rope on a windlass, and several plows being attached to the rope they are dragged from end to end of the field, passing back and forth, turning furrows in both directions. The engine is advanced on the *head-ridge*, at intervals, as the field is being tilled. This is called Fowler's system of steam plowing. The second class consisted of rotary steam cultivators, having traveling engines. This sort of cultivator tears up and pulverizes the soil, and may be called "a rotary digger harrow." The other system consisted of double sets of cultivators, the one set operating while moving in one direction; then these are thrown out of gear and another set brought into play in returning. They are operated by an endless wire-rope and stationed portable engines. Two prizes were awarded; the one of £50 ($250) to Messrs. Fowler; the other of £25 to Messrs. Howard—the latter being double steam cultivators. The endless wire rope system of steam plowing has always been preferred in England, and it seems to have been most successful in every contest for prizes. Although the apparatus is bulky, it economizes a great amount of engine power, compared with the steam plows whose engines travel over the soft soil. The amount of steam power required to move the engine itself is stated to be three times more than that for dragging the plows. Most all the portable steam engines now built for English farmers are provided with windlasses suitable for steam plowing.

Twenty-four mowing machines were also tried upon a field of very heavy grass. The first prize of £20 (about $100) was awarded to Mr. Cranston (Wood's American mower), the second to Messrs. Burghess and Key, (McCormick's American mower we believe), the third, $25, to A. Samuelson—an English mower.

There was also an exciting trial with horse rakes. This class of implements, like that of mowers, was first practically introduced into England a few years since from America.

BESSEMER'S PROCESS OF MAKING STEEL.

We invite attention to the extracts, on another page, of a paper recently read by Mr. Bessemer on his process of refining iron and making steel. Six years ago the first experiments with this process attracted a great deal of attention throughout the world, it being regarded as holding forth the promise of working a complete revolution in the mode of refining iron, and very materially reducing the price of steel. The doubts in regard to the matter were such as are inseparable from all untried innovations, and the world has been watching the progress of the enterprise with very deep interest. The evidence, therefore, which Mr. Bessemer produces of the complete industrial success of the manufacture, and of the very superior qualities of his iron as well as of his steel, will attract general attention among mechanicians.

The statement in relation to the six steam boilers of Messrs. Platt Brothers, of Oldham, is particularly remarkable. These boilers are 6 feet 6 inches in diameter, with flues through them 4 feet in diameter; the thickness of the plate is $\frac{5}{16}$ths of an inch, and the working pressure 100 lbs. to the square inch.

The Bessemer steel seems to be the very best material for ordnance. It will be observed that Mr. Bessemer says that works sufficient to turn out steel enough to make forty 18-pounders per day may be erected for $25,000.

Mr. Bessemer took out a patent in this country, but it was subsequently set aside in a case of interference with Wm. Kelly, of Lyon's county, Ky., who was held to be the first inventor. Would not some of our enterprising iron manufacturers make a good operation by getting hold of this patent and starting a manufactory of the steel in this country?

THE MOST POWERFUL GUN IN THE WORLD.

We are sure that none of our reaers will fail to read the account, on another page, of the trial of the great Union gun. There have been guns made in Europe of much larger caliber than this, but none of them of sufficient strength to give any considerable velocity to the shot. This gun is 12 inches in diameter, and, being rifled, carries an elongated shot weighing 423 lbs.—nearly the same weight as the round ball of Rodman's 15-inch gun, which is 425 lbs.

The London *Engineer*, in speaking of the recent experiments at Shoeburyness, calls Armstrong's 200-pounder the most powerful ordnance in the world, but the shot of the big gun at Fortress Monroe is more than twice as large, and the gun is consequently more than twice as powerful. These two guns, the 12-inch rifled and the 15-inch smooth-bore, are the most powerful pieces of ordnance that have ever yet been made.

The introduction of iron-plated ships has made it very desirable for sea-coast defence to have enormous cannon, the shots from which would break the iron plates to pieces. But, until Rodman's improved mode of casting was invented, it was impossible to make large cannon strong enough to bear the charges required to give effective velocity to balls weighing 400 lbs. These circumstances cause peculiar interest to attach to the trial of the 12-inch rifled cannon, and we are much pleased at being able to present so good a description of this trial.

HEALTH OF SOLDIERS.—Dr. Hall, editor of *Hall's Journal of Health*, is very emphatic in indorsing the good qualities of a little book recently issued under his editorial supervision. He says:—"The editor wrote the book, but feels no hesitancy in giving it high praise, because it was taken mainly from the Bible, Watts's hymns and the SCIENTIFIC AMERICAN—all good authority."

A NEW TRADE.—A new branch of trade has just developed itself at Wilmington, Del., the results of which will, no doubt, tell upon the prosperity of that city. The lumber mills have been for a long time past, and are now, engaged in sawing lumber for the English ship-builders. The material worked is principally of the choicest oaks.

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SURFACE CONDENSATION ON STEAMERS.

The sudden condensation of steam in a close chamber connected with the cylinder of an engine, effects a considerable saving of power, by the differential gain which is secured in obviating atmospheric resistance, by producing a vacuum in front of the moving piston. This saving is obtained in all condensing engines—both land and marine. The system of condensation most commonly used has been by direct contact condensers. The steam is exhausted into a close chamber where it meets with a shower of cold water, and is directly condensed, mixing with the injection water. On land, where plenty of fresh soft water can be obtained, it is the best method, but where the water is hard, such as at sea, it is apparent that if the steam can be condensed without coming into direct contact with the salt water which must be used for refrigeration, the pure water formed by the condensed steam may be used over and over again, to feed the boilers and thus effect a great saving of fuel.

The use of salt water in steam boilers is very objectionable in comparison with fresh water, because the brine in the boiler becomes concentrated in proportion to the generation of steam, hence a great amount of hot water has to be blown off regularly, thus involving a waste of fuel by the loss of heat. Another loss is also involved in the use of salt water by the formation of non-conducting scale in the inside of the boiler. From the moment a steamer leaves the dock until it reaches the end of its voyage, a thin but increasing scale of sulphate of lime, forms on the surface of the iron, and this obstructs the conduction of heat from the furnace to the water.

It is generally considered that about from 25 to 30 per cent more fuel is required by the use of salt water in comparison with fresh water in boilers. Efforts were early made with sea steamers to condense the steam by what is called "surface condensation," in order to obtain fresh water for the boilers, but owing to mechanical defects in the apparatus, they failed to operate satisfactorily. The alternate expansion and contraction of the numerous condensing tubes and chambers, soon worked the joints loose and caused leakage. Surface condensers for sea steamers were always desirable, but the failure of early experiments engendered a general prejudice among engineers against them. That heroic class of men—inventors—who are rather inspired than deterred from labor by the failure of others, when hope points the way, never lost sight of the importance of surface condensers for sea steamers, and they never became completely disheartened respecting their practicability, and success has at last crowned their efforts. Seven years ago there was scarcely a surface condenser in use, now this method of condensation is being applied to almost every new steamer that is being built in England and the United States. Pirsson's condenser has been successfully used on the frigate *San Jacinto* and several other steam vessels, and all the new naval gun boats are to be furnished with Sewell's surface condensers. The London *Mechanics' Magazine* states that the Cunard Company, the Peninsular and Oriental Company, besides several others, are having new steamers built with surface condensers, and it is expected that in a few years surface condensers will be universal in the steamers of the British navy.

The rapid change from inside to surface condensers in steamers is remarkable for its extent. All the leading builders of marine engines on both continents are abandoning the old common mode and adopting the improved system. This is not surprising when it is considered that it will effect a saving of about 25 per cent in fuel and permit the room occupied by this amount of coal to be devoted for carrying paying cargo. The total amount of saving by substituting surface for inside condensers in steamers is at present unknown, but it is held to be no less than about thirty per cent.

It seems to be an unquestioned fact respecting the economy and adaptability of surface condensers to sea steamers, but for stationary engines on land, the subject has received but little attention. We take this occasion to invite engineers to examine this application of condensation, which we are confident may be applied with benefit in every situation where hard water is now used for feeding boilers.

It is well known that great trouble is experienced in numerous sections of our country where steam engines are employed, by incrustations forming on the boilers on account of the use of hard water. This trouble can be obviated, and a considerable saving in fuel effected by the use of surface condensers. It is true that most of the engines used are high pressure and non-condensing; but would it not be well to try a new class of engines, in which high pressure steam in the boiler and surface condensation in the engine may be combined?

THE ENGLISH GOVERNMENT AND THE ARMSTRONG GUN.

The last number of the London *Engineer* contains a leading editorial on the right of inventors to their ideas, which is written in so spirited a manner that we are induced to republish it in full, and it will be found in another column.

The writer incidentally remarks that the Armstrong gun "*is inevitably destined to be abandoned as too complicated and costly for common use; guns of the simplest construction and made of soft steel being absolutely more effective.*" It will be remembered that the London *Mechanics' Magazine* has long regarded it as settled that this gun was a failure; and now, after all the experiments that have been made, the rival publication, *The Engineer*, coming out so emphatically with the same opinion is pretty conclusive proof of its correctness.

The English Government paid Armstrong $100,000 for his patent, and has expended more than 10,000,000 of dollars in constructing his guns for the army and navy. There can be little doubt that these will all be laid aside, and their places supplied with muzzle loading guns. Slow as John Bull is he seems quite as apt as some faster nations to go off half cocked.

PREMIUMS—BRITISH INSTITUTION OF CIVIL ENGINEERS.

This institution invites communications offering premiums of 25 guineas (about $125), for meritorious essays on the following subjects:—

"Reclaiming Land from Seas and Estuaries."

"Accounts of existing Water Works, showing the methods of supply, the distribution throughout the Streets of Cities, and the general practical results."

"On the results of the use of Tubular Boilers, and of Steam at an increased pressure for Marine Engines, noticing particularly the difference in weight and speed in proportion to the Horse-Power and Tunnage."

"On the Form and Materials of Floating Batteries and Iron-Plated Ships (*Fregates Blindees*), and the points requiring attention in their construction."

"Railway Accidents—their causes and means of prevention; showing the bearing which existing legislation has upon them."

We have received the schedule of the Institution, containing a list of the subjects and the premiums offered. The number of subjects for which premiums are offered is 56; but pecuniary awards are only offered for essays of distinguished merit on the above five subjects. The other prizes will consist of medals, books, &c., according to the judgment of the council.

These premiums are open to all persons—natives of Great Britain, Americans and all foreigners.

The communications are required to be written in the impersonal pronoun, and be legibly transcribed on foolscap paper, in size about 13 by 8 inches, with lines three-fourths of an inch apart. It must be written upon one side only, with a margin of 1½ inches on the left side.

The drawings which may accompany an essay should be on mounted paper, with as many details as may be necessary to illustrate the subject, and should be upon such a scale as may be clearly visible when suspended on the walls of the theater of the Institution at the time of reading.

No paper will be accepted which has been published in any form, or which has been read before any other scientific society. We do not publish the entire list of subjects, as it would occupy too large a space in our columns. We really wish we had such an institution in our own country, for inciting our engineers to collect and arrange the practical information which they acquire in their profession. If any of our American engineers enter the lists as competitors for the above pecuniary premiums, they must forward their papers to reach London by the 1st of January, 1862, directed to Charles Manby, Esq., or James Forrest, Esq., Secretaries, No. 25 Great George street, Westminster, S. W. A list of the other subjects for medals, prizes, &c., may be seen at the office of the SCIENTIFIC AMERICAN.

BLINDNESS AMONG HORSES—ITS CAUSES.

This is a subject of very general importance. It has been stated that blindness is more prevalent among horses in America than among those of other countries. If this is the case, the causes of the evil should be investigated and removed—if possible—without delay. The last number of the *American Stock Journal* contains a good article on the subject, the leading ideas of which we have condensed for our columns. It states that blindness is more prevalent among horses in Ohio than those of any other section of the country. The cases of blindness are attributed, in a great measure, to *over feeding*—the Ohio horses being notoriously fat. It is a common practice in that State to force the fat upon horses intended for sale, by stuffing them principally with Indian corn, and keeping them, without much service, in warm, close stables. This method of feeding soon fattens a horse, but at the same time its digestive functions are injured by the treatment. It is now believed that the blindness can be traced to a sympathetic relation between disorder of the digestive organs and the brain, and that through the latter the optic nerve becomes diseased and ends in destroying the vision. Blindness is also frequently transmitted to offspring, and thus an evil, first originating in disease, almost becomes a natural defect by hereditary descent. Errors in feeding horses, as is well known, also produce blind-staggers, stomach-staggers and organic disease of the brain; therefore the greatest care should be exercised in feeding them.

In order to prevent the spread of horse blindness, it is recommended that whenever an animal shows the least symptoms of the disease it should be kept on a light diet of hay and oats. A horse may be maintained in good condition on 12 pounds of hay and 5 pounds of oats for daily feed. In breeding horses it is also recommended that all animals showing the *least symptoms* of organic disease be rejected.

One of the first symptoms incident to blindness—which any person may readily notice—is the disposition of the animal to raise his fore legs unnecessarily high, while, at the same time, the ears are drawn backward and forward in quick succession, thus giving evidence that the sagacious animal is sounding the ground over which he travels.

These are the principal ideas advanced by our cotemporary respecting the cause of prevalent horse blindness in our country, and the mode of arresting a spread of the evil. There are some other causes of this disease which appear to us more evident, and which are perfectly capable of removal. Blind horses are more common in cities than in the rural districts. This we consider is principally caused by bad stables. Many of them are under-ground cellars, and, with few exceptions, all stables are too small. They do not admit a sufficient quantity of fresh air for ventilation and respiration, and this always tends to injure the health of the animals. Light is as essential to the health of horses as that of men, and yet most stables are nearly as dark as dungeons. Several years since, a great number of valuable French cavalry horses were attacked with glanders and other diseases, of which they died. It was recommended that more spacious stables should be erected. The suggestion was acted upon, and, with improved army stables, there is not one-fourth the the cases of sickness now among the French cavalry horses. This fact is invaluable. It would be far better for most of the horses in our cities to be kept in open sheds than in the stables commonly provided for them

We are also positive that eye-blinds on the harness tend to injure the eyes of horses, and as they are totally useless and unsightly appendages, they should be abandoned entirely. We are aware that, of late, the open bridle has become more common, but it should be universal. Tight, close collars, which squeeze the eyes of horses in putting them on, are also very injurious to the eyes of the animals. We have known one case of permanent injury to the eyes of an excellent horse from this cause. Carriage and draft horses should be provided with divided collars, secured either at the top or bottom, so that they are not required to be forced over the heads of the animals.

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Oxychloride of Zinc for Filling Teeth.

The last number of the *Dental Cosmos* contains a very useful and interesting article on this subject, by Dr. J. T. Metcalf, which we condense partially for our columns. He says :—Some eight or nine years ago, I read in the New York SCIENTIFIC AMERICAN a short paragraph copied from a foregn journal, to the effect that oxyd of zinc became hard like stone on being mixed with a solution of chloride of zinc, and that the compound would be useful in filling teeth. The experiment was soon tried, and the result seemed at first promising ; but my hopes were dashed by discovering that, although not changed by pure water, the substance was rapidly decomposed by water slightly acidulated. This fact caused the abandonment of further experiments until 1859, when the large claims made for this material under various names again drew my attention to the subject. At that time, with the view of determining the proportions in which the materials should be combined to afford the best results, I instituted a series of experiments in the laboratory as well as in the operating chair, using various preparations, and speedily became convinced of the difference as to durability in the many sorts offered for sale.

But first I would consider the question of its applicability, as well as point to some cases in which it can always be better employed than any other known material.

1. *In most cases, if not in all, when exposed to the action of the fluids of the mouth, it is slowly dissolved.*—The necessary inference consequently is that it cannot be relied on for a permanent filling. Some fillings put in two years ago remain at this time as good as ever ; while others with the same material, and apparently under as favorable circumstances, were washed out in half that period. Some on the grinding surfaces of molars, subject to the friction of mastication, remain perfect, while approximal and buccal cavities fail, and *vice versa*. This is the experience of dentists with whom I have conversed on the subject ; and, though it detracts from the usefulness of the filling, does not destroy it. Far better save a tooth for two or ten years than lose it without an effort. I know there are some who hold that a tooth which cannot be filled with gold had better be extracted at once.

But there are teeth in which oxychloride of zinc may be used with *permanent* advantage and in which its peculiar qualities will commend it to all. I refer to those cases, generally molars, where the enamel remains, for the most part sound, while the bone under it is extensively decomposed ; the cavity running up into the cusps, and having but little more sound dentine than enough to cover the nerve pulp. It is exceedingly difficult, if not impossible, to fill such a tooth with gold, and make even a decently solid plug without cracking or splitting the enamel. The usual course is to break down the edge of the enamel until it is sufficiently strong to bear the pressure, the interior being freely exposed and accessible. This in undoubtedly the proper course when the tooth remains strong enough to admit of it. But in not a few cases the whole of the crown breaks away under such treatment, and the tooth is pronounced "too far gone" to fill.

With the help of oxychloride, all these difficulties vanish. In such cases, it is only necessary to make the external opening large enough to excavate all the decayed bone, making the edge clean and without sharp angles. Then, having protected the nerve with gutta-percha, or by evaporating collodion in the bottom of the cavity, or such other substance as may be found to answer as well, fill to the surface with oxychloride. When sufficiently hard, excavate to the edge of the enamel a suitable cavity, with parallel sides for a gold plug, taking care to leave no particle above the edge of the cavity. This may be filled with gold, and perfectly consolidated without the slightest risk. The oxychloride is thus protected from the action of the saliva, while it sustains and strengthens the tooth, making a permanent and beautiful operation.

Some fears have been expressed lest the caustic nature of the chloride of zinc might affect injuriously the bone of the tooth with which it comes in contact. I have examined many fillings with a view of determining this point, and have yet to find the first case where any perceptible detoriation of the bone could be justly attributed to the action of the filling. Where the filling remains sound, the bone will be found sound also.

2. *Contact of moist oxychloride with sensitive dentine causes pain more or less severe.*—By far the greater number of cases in which it is unquestionably useful are dead teeth. The roots having been filled with gold, oxychloride is used to build up the crown and supply the lost bone. But cases not unfreqnently present themselves like the following :—

A young lady called to have two lateral incisors filled. Approximal and posterior cavities had united to destroy a large part of the teeth, but leaving the front plates of enamel, including the cutting edges and sides, perfect, but so thin as to show distinctly the color of any substance under it. The nerve was not exposed, but the dentine over it exceedingly sensitive. After cutting away the thin edge and removing the decomposed bone, the shape of the cavity was such as to render a gold filling quite out of the question. The mere attempt would have split the tooth across. Obviously, nothing could answer so well here as oxychloride of zinc. Its color, when seen through enamel, was made to match the adjoining teeth, and its perfect adaptation and strong adhesion admirably fitted it for the case. The only drawback attending this operation was the pain, which was very severe during and for three hours after the filling was introduced. With the opposite lateral, which was in a similar condition, a drop of collodion evaporated over the nerve had the effect of mitigating the pain produced by the filling.

After fifteen months these fillings remain good, but will doubtless have to be renewed some time hence. By using a solution of gutta-percha, collodion, or some protection of that character over the sensitive dentine, very much, if not all, the pain which sometimes attends the use of this material may be avoided.

3. *While in process of hardening, contact with water retards and arrests its induration.*—This is sometimes a serious obstacle in the way of a satisfactory operation, and occurs most frequently where the cavity runs down to or below the gum. Every care should be taken to keep the filling dry by napkins, bibulous paper, wooden wedges, ligatures, or such means as may be applicable to the case, until the material hardens sufficiently to be but little injured by getting wet. I have made specimens which were hard enough to scratch marbles five hours after being mixed ; but if put into water ten minutes after being mixed, it will never acquire that density. By using a material which hardens quickly, good results may generally be reached.

I have instanced but a few circumstances under which I consider this filling peculiarly applicable ; but from these it may readily be inferred what range it should take in careful practice. Wherever a gold or tin filling may be used, plastic materials should be dispensed with, except, perhaps, where the speedy destruction of the tooth is anticipated from other causes.

Method of Preparing Oxyd of Zinc.—Triturate thoroughly in a mortar refined borax, 1 part by weight ; quartz, 2 parts, and then add gradually 45 parts pure French zinc, white. When perfectly incorporated, calcine in a Hessian crucible, at a good red heat, for eight or ten minutes. This forms a *frit*, which, when cool, must be ground very fine, in small quanties at once, together with trifling portions of coloring matter, such as yellow ochre and burnt umber, to impart the desired shade. To 1 part of the pulverized frit, add three parts, by weight, of calcined zinc, and combine thoroughly in a mortar. The powder is now ready for use, and should be bottled and stopped tight. That which is recently made sets quicker and becomes harder than the old ; consequently it is better to calcine but a small quantity at once.

The solution is made by dissolving 1 once of the dry salt chloride of zinc in 6 drachms of water. If made weaker, the paste requires a longer time to set, and is not so hard ; if stronger, it attracts moisture from the air on exposure, proving that a part of the chloride remains uncombined. Sometimes borax has been dissolved in the solution, but without improving it.

THE gunboat *Underwriter* (formerly a powerful tug), at Washington, has been armed with a huge 80-pound rifled gun, weighing six tuns ; also, an 8-inch gun.

Chemical Stoneware Manufacture.

The *Chemist and Druggist* (English) contains a description of the manufacture of stoneware for chemical vessels, as conducted at the potteries of Messrs. J. Cliff & Co., Lambeth. The materials employed for this kind of ware are chiefly white clays obtained in the counties of Devon and Dorset, which are mixed with a certain amount of china clay from Cornwall. This ware is glazed with a proportion of feldspar and Cornish stone ; sand, ground flint, together with pounded broken earthenware, are also mixed in with the clays. About 400,000 tuns of pottery are produced annually in England. The *Chemist and Druggist* says:—

The Devonshire clays are purer than those of Dorset, and are used for the manufacture of the smaller wares. Those of Dorset contain a certain admixture of lime and iron, rendering them less pure, and consequently of less value. They are used in combination with a certain amount of the Devon and Dorset clay for the larger vessels.

The articles intended for the use of chemical manufacturers require great care in making and burning, both as to the proper proportions of the materials employed and their due admixture. These vessels have frequently to resist the action of the strongest acids, and that at a high temperature ; consequently, it is absolutely necessary that they should admit of a certain amount of expansion and contraction without breaking. This quality is obtained by the mixture of complex materials, that of each manufacturer varying from the other.

The clays employed at these potteries are sent from the pits in cubical tesses, weighing usually about 35 lbs. each. After having been well dried, these are reduced to powder in a crushing mill. The due admixture requisite to form the articles required is then thrown into a pug mill, which is an an upright cylinder about six feet deep by two in diameter, having a perpendicular shaft running through it. This shaft, which is caused to rotate by steam power, has a number of blades set on it, forming a kind of screw. These arms or blades so to work among the powdered clay, &c., &c., as to mix them intimately with the water admitted, at the discretion of the workman, into the cylinder through a pipe, and, by their continued action, to force it out of the bottom in a plastic state, of such uniform consistency, and so free from bubbles of air, that it is fit for the thrower, who fashions it into the required form on the potter's wheel. This is a kind of lathe, formed of a shaft, having a vertical instead of the usual horizontal position. On the upper extremity of the upright shaft of this lathe is fixed a small circular disk, which revolves with it. On this disk the workman places the lump of prepared clay, and, by pressure with his hands, aided by a few simple tools, fashions the yielding material into any required shape with a truly marvelous degree of dexterity and rapidity. It is with the aid of this simple contrivance that almost all circular articles are made, from penny ink bottles to enormous vessels manufactured by Messrs. Cliff, some of which are capable of holding 800 gallons.

The vessels having been made, are placed in the drying room to become thoroughly dried ; after which those termed "double-glazed stoneware," such as spirit cans, druggists' pots, &c., are dipped in liquid glaze, and taken to the kiln to burn. This, as usually constructed, is a large circular room about 10 to 15 feet in diameter, and 14 feet high. It is lined with the best firebricks, and has at its sides a number of openings to admit the heat from the fires. It has also apertures in the roof to allow the escape of the waste heat and smoke. The articles to be burned are placed in the kiln, piled up on one another, if small goods, or if large, singly, on slabs. The opening is then built up and carefully cemented over, when the fires are lighted, and are gradually increased until every article in the interior becomes heated to an intense white heat, which process takes, with a 15-foot kiln, from forty to fifty hours, consuming ten tuns of coal. If the articles are to be salt glazed, a quantity of very coarse salt is thrown in through the holes left in the roof of the kiln, and into each fire hole, shortly before the termination of the firing. This is at once converted into vapor by the intense heat, and is decomposed. The soda of the salt unites with the silica of the clay, and forms a fusible glass or glaze upon the surface. So perfect is this glazing that articles thus protected have been found to resist for twenty years without deterioration the action of the nitrous acid of commerce. After the glazing operation, the kiln is carefully stopped to prevent draughts of cold air, and is then allowed to cool for thirty or forty hours before it is opened and the articles removed.

Coating Iron with Lead and Alloys.

A patent has been recently taken out in England by W. Bagley and W. Mincher, of Birmingham, for coating iron with lead and alloys of lead and copper. The surface of the iron is first cleared of all oxyd by dipping it into dilute hydrochloric acid and scrubbing it thoroughly ; after which it is carefully washed in clear, soft water. A vessel containing a solution of chloride of lead and a hydrochloric solution of arsenious acid is now used as a bath into which the cleansed iron is dipped, and kept until a coating of lead and arsenic forms on the entire surface. The iron is now lifted out and dipped into a bath of molten lead or an alloy composed of lead and a very small proportion of copper. In this manner the iron is completely coated, and for roofing purposes this may be a good improvement for treating sheet iron to enable it to withstand exposure to the weather without rusting. Arsenic is objectionable to use in the arts, but it is employed extensively in making shot, and may be safely used in coating iron.

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Patent Claims

ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING AUGUST 20, 1861.

Reported Officially for the Scientific American.

PATENTEES, READ THIS.

The new Patent Laws which went into force on the 2d of March last, authorized the Commissioner of Patents to have all the specifications which form part of the Letters Patent printed.

This is a wise provision, and it renders the documents much handsomer than the old system of engrossing them on parchment; besides, in passing before the printer and proof-reader, the clerical errors, which were often made by the copyist, are mostly obviated, thus rendering the patent more likely to be correct.

But, to enable the printer and proof-reader an opportunity to do their work properly, the Patent Office is obliged to withhold the Letters Patent after granting them, for about *three weeks* after the claims are published in the Scientific American.

This explanation is intended to answer scores of letters received from patentees at this office every week, inquiring why they do not get their documents. We trust it will also save the Patent Office the trouble of writing to every patentee to explain the cause of their not receiving their patents the moment they see their claims published in these columns.

Munn & Co.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 4, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

2,062.—R. A. Blair and John B. Reed, of New Philadelphia Ohio, for an Improvmenet in Plow Clevis :

We claim the employment, or use, in combination with the clevis, B, of the clasp, E, and screw rod, F; the whole being applied to beam, A, of the plow, substantially as and for the purpose set forth.

[The object of this invention is to obtain a plow clevis which will be capable of being very nicely graduated, in order to give the plow "more or less land," as it is technically termed, and a slice of the required width, and the invention at the same time serving to render the plow beam more durable than hitherto.

2,063.—George W. Blake, of New York City, for an Improved Low-Water Detector for Steam Boilers :

I claim, first, The combination of the steam pipe, P, valve-box, G, the opening, d, and passage, e, with the siphon tubes, B N and I, substantially as and for the purpose described.

Second, The arrangement of the two levers, M K, and their connection, g, in combination with the expanding tube, valve-box and valve-stem, and with a fixed support, F, substantially as and for the purpose specified.

2,064.—Thomas Boyd, of Boston, Mass., for an Improvement in Ventilating Tents :

I claim a cap or covering so arranged as to be susceptible of motion in a vertical or up-and-down direction, and so operating that the tent can be ventilated in both stormy and pleasant weather, substantially as set forth.

2,065.—John H. Brown, of England, for an Improvement in Preparation of Grounded Gunpowder to Serve as Charges for Firearms :

I claim a charge for loading ordnance and firearms, as made by combining and pressing grains of gunpowder with an adhesive solution into a solid form, substantially in manner as set forth.

2,066.—Wm. S. Carr, of New York City, for Improved Water Closets :

I claim, first, The receiver, b, fitted with the cover, g, and sustained upon legs, a a, for the purposes and as set forth.

Second, I claim the combination of the basin, c, and a dam, h, fitted in such a manner as to be turned up to retain water in the basin for the purposes specified.

Third, I claim the manner specified of forming the dam, h, of a sheet of elastic material clamped between the basin, c and the receiver, b, as specified.

Fourth, I claim the arrangement of the shaft, i, and elevator, k, in combination with the dam, h, in the manner specified.

Fifth, I claim the foot lever, m, applied substantially as specified to empty the contents of the basin, c, and cause the flow of water for washing the basin, as set forth.

Sixth, I claim the levers, l and m, arranged in the manner specified, in combination with the crank, b, and valve, e, for the purposes set forth.

2,067.—Wm. G. Creamer, of Brooklyn, N. Y., for an Improved Ventilator for Railroad Cars :

I claim the construction of a tunnel-shaped opening within the walls of the car substantially as described, and the connection therewith of a self-acting blind or deflector, operating substantially as described and for the purpose mentioned.

2,068.—H. N. Dalton, of Jacksonville, Cal., for an Improvement in Seeding Machines :

I claim the hounds, J J, pivoted, at i i, to frame, A, and mounted on the castor-wheel, N, in combination with the bearing-plate, k, adjusting screw, K, and rocking nut, j, all arranged in the manner and operating as described.

[This invention relates to certain new and useful improvements in preparing the soil, and for sowing seed broadcast. It consists in arranging under the bottom of a seed hopper furnished with a reciprocating seed slide, a wire sieve shelf for receiving and more uniformly distributing the seed over the land as it falls from the hopper.

Secondly, It consists in combining with an adjustable frame, carrying the seed-distributing apparatus, a series of rotating blades, arranged spirally on a transverse shaft, and placed in advance of the distributing apparatus, for pulverizing the earth and planting the seed.

Thirdly, In a novel arrangement for adjusting the front and rear ends of the frame of the machine, whereby the rotary blades may be raised or depressed, while the machine is in operation, in a simple and convenient manner.]

2,069.—C. H. Dascomb, of Cleveland, Ohio, for an Improved Cane and Seat Combined :

I claim the jointed sections, A and E, the seat, D, and sleeve, C, when arranged and operating in the manner and for the purposes set forth.

2,070.—Albert R. Davis, of Syracuse, N. Y., for an Improvement in Spoke Machines :

I claim the series of carriages, B, placed in an inclined bed or frame, A, in connection with the vertical and lateral pressure rollers, F Q J, vertical slides, E, weights, G, horizontal bars, H, rods, I, vertical slides, M, weights, N, and rotary cutters, S, arranged for joint operation as and for the purpose set forth.

I further claim the slides, H', when arranged and used in connectio with the parts above enumerated, as and for the purpose specified.

2,071.—Elliot Dickerman, of Middlefield, Conn., for an Improved Clothes Frame :

First, The hook, F, sliding in the groove, e, and arranged to support the hub, D, upon its projection, f, as herein set forth.

Second, The combination of the cylindrical-grooved post, C, hub, D, and reel, H, as and for the purposes specified.

Third, Providing a clothes dryer with folding legs, l l, arranged to be extended by the depression, and closed by the elevation of the hub, i, as set forth.

2,072.—N. I. Eldred, of Elkhorn, Wis., for an Improvement in Eaves Troughs :

I claim, first, The employment of the cross-bar, C, constructed as represented and secured to the trough substantially as specified.

Second, The combination of said cross-bar, C, as constructed, with the bar, D, bolt, a' and nut, c, the several parts being arranged as and for the purposes specified.

[This invention consists in the employment or use of metal straps attached to the roof and to the trough, whereby eave troughs may be attached to roofs, and adjusted with a proper pitch, with great facility, and held in a very secure manner. The invention is applicable to tin or sheet metal eave troughs.]

2,073.—Harrison Elliott, of Boston, Mass., for an Improved Screw Propeller :

I claim the flanged-blade propeller herein described, the form of the flanges being determined by a plane perpendicular to the axis of the propeller and passing through the rear corners of the blades, and a plane parallel to the axis of the propeller and passing through the advance corner of the blades, substantially as set forth.

2,074.—Gustavus Finken, of Brooklyn, N. Y., for an Improvement in Apparatus for Manufacturing Cube Sugar :

I claim the combination, in the manner and for the purpose shown and described, of the rotary-wheeled spring piston, b, with the disk, A, and cam, F.

2,075.—T. N. Fisher and J. H. Zinn, of Newport, Pa., for an Improvement in Stoves :

We claim, first, A stove in which the end and side plates are hinged to the bottom plate, so that the said plates may be folded for convenience in transportation.

Second, A stove in which the end and side plates are held together and fastened by means of a joint and lock substantially like those described.

Third, The keys, e e, when formed and applied and operating in a three-fold capacity as set forth.

Fourth, A stove in which the top plate is wholly substituted by the cooking utensils, which utensils are so proportioned in respect of width and depth that one may contain the other or others and othe adjuncts of the stove.

Fifth, A stove in which the gas pipe is affixed to the gas exit in the manner specified.

2,076.—Nelson Gabel, of Gratis, Ohio, for an Improved Churn :

I claim the employment and arrangement of fixed pinion, a, reciprocating racks, b b, and slides, h h, substantially as and for the purpose set forth.

2,077.—Edwin A. Hall, of Jacksonville, Ind., for an Improvement in Washing Machines :

I claim the arrangement of angular box, A, ribs, C, and alternate open rubbers, G G', the whole being combined and operating together as set forth.

2,078.—P. J. Hardy, of New York City, for an Improved Camp Chair :

I claim, first, The combination of the curved-notched link, d, hinged to the seat, with the curved arm, e, hinged to the back, in the manner and for the purposes specified.

Second, I claim the legs, f, with the cross-piece, g, in combination with the legs, h, and cross-piece, i, in the manner specified, whereby the seat is sustained by the pieces, g and i, coming in contact when the legs are in an X form, as set forth.

Third, I claim the supporting frame, k, attached by the cross rod of the joint, 7, and fitted to fold between the legs, h, and beneath the seat when the chain is folded as specified.

2,079.—John K. Harris, of Allensville, Ind., for an Improved Press, for Pressing Hay, Cotton, &c.:

I claim the follower and "beater," O, in connection with the screws H H, and hoisting rope, M, or analogous devices, so arranged and applied as to admit of the follower and "beater" performing the filling or packing and also the compresssing operation, substantially as set forth.

I also claim the means, substantially as shown and described, for operating or opening and closing automatically the feed door, F, to wit, the cord, j, connected to the lever, g, which is attached to the rod, f, in the door, the curved arms, h i, and hooks, c c, and the cord, j, passing over suitable pulleys, j' j'', and connected at its ends to levers, k G, which are actuated respectively by the follower and beater, O, and pin, v, of wheel J.

I also claim the pulley, K, wheels, J n n, and endless chain, I, in combination with the slide, L, catch, t, stop, U, and projection, bx, for operating the screw shafts, H H, and rope, M, substantially as described.

I further claim the guide bars, s s, attached to the inner sides of the uprights, B B, and fitted in notches or recesses in the inner sides of the nuts, S S, to serve as guides for the latter, and also as guides to the bars, Q Q, of the follower, the ears, r r, of which are at each side of the bars, s s.

2,080.—Henry Hassenpflug, of Huntington, Pa., for an Improvement in Lamps :

I claim my improved lamp, having the reservoir, A, the wick tube carrier, D, and the wick tube, E, wick tube chamber, d, and the female screw cap, I, constructed and arranged in relation to each other so as to operated as specified.

2,081.—C. Hodgkins, of Marlboro, N. H., for Improvement in Sewing Machines;

I claim, first, The combination of the jointed arcs, K L, fitted between the feed ring, J, and its supporting block, M, the lever, N, and its cam, f, and the screw, i, the whole arranged substantially as described, in relation to each other and to the cam, O, on the feed shaft, G, and operating as set forth.

Second, so arranging and applying the rotary looper in combination with an eye-pointed needle for making the chain stitch that the point of the looper enters the loop of the needle thread while below the axis of rotation of the looper, substantially as described, or in other words, while on the opposite side of said axis to that on which the cloth is situated.

2,082.—G. A. Huwald, of Knoxville, Tenn., for an Improvement in Apparatuses for Treating Cane Juice with Sulphurous Acid Gas :

I claim, first, In the treatment of sugar juices with sulphurous fumes, the introduction of the gases to the sugar juices through a sulphur fume pipe, F, and a perforated vertical pipe, E, which is inclosed by a vertical juice column, A, substantially in the manner and for the purposes set forth.

Second, The combination with the juice column, A, and verticulated sulphur fume pipe, E, of a suction and forcing device and sulphur burning retort or pan, G, substantially as and for the purposes set forth.

Third, In apparatuses for treating sugar juices with sulphurous fumes, making column, A, in sections, a a1 a2 a3, with partitions, b b b b, which are perforated or have tubes, c c c, extending down through them and below their surface, in combination with perforations in the pipe, E, which are located some distance above the surface of the partitions, substantially as and for the purposes set forth.

2,083.—E. L. Jones and M. E. Carter, of St. Louis, Mo., for an Improvement in Dovetailing Machines :

We claim the combined arrangement of the mitering, mortising and tenon-cutting devices in the machine, substantially in the manner and for the purpose specified.

2,084.—S. D. Jones, of North Dighton, Mass., for an Improved Washing Machine :

I claim my improved washing machine, having its reservoir, A, its dasher, F, its shaft, D, its disk, E, its cranked arm, m, constructed and arranged in relation to each other, and so as to operate as specified.

I also claim the employment of the adjustable disk, I, in combination with the vessel, A, the dasher, F, the shaft, D, the disk, E, and so as to operate in the manner set forth.

2,085.—Wm, F. Ketchum, of Buffalo, N. Y., for an Improvement in Hand Grenades :

I claim the combination of the tubing and concealed cap therein, with the adjustable plunger and adjustable winged guide, arranged for a hand grenade, substantially and for the purposes described.

2,086.—Marcus Lane, of Washington, D. C., for an Improvement in Treating Metals :

I claim, first, Imparting a partially circular motion to the molten metal by means of the semi-spherical form of the chamber, B, and the tangentially-arranged pipe or gutter, C, substantially as and for the purposes set forth.

Second, Continuing the circular motion in the metal by combining the semi-spherical form of the chamber, B, tangentially-set gutter, C, and tangential blowpipes, E E, substantially in the manner described.

Third, Supplying carbon with the air at a point below the surface of the metal, to a circulating mass of metal, by means substantially such as described, for the purpose set forth.

2,087.—D. C. Lawrence, of Cedar Falls, Iowa, for a Combined Penholder and Letter Balance :

I claim a combined writing instrument and weighing apparatus, constructed and operating substantially as described.

2,088.—Henry Lowe, of Baltimore, Md., for an Improvement in Paper Pulp or Stock :

I claim the described paper stock or pulp, having a short fiber, as a new article of manufacture, the same being made from killed or spoiled stock, or from vegetable substances having naturally a very short fiber, substantially as set forth.

2,089.—Perry Marcy, of Tunkhannock, Pa., for an Improvement in Potato Diggers :

I claim the arrangement of the lever, e, spring, i, and connecting rod, f, with the screen operating as set forth, the several parts being used as and for the purpose specified.

2,090.—Charles McBurney, of Roxbury, Mass., for an Improvement in Utilizing Waste Vulcanized Rubber :

I claim the use of the oils mentioned, in combination with waste vulcanized india-rubber and crude gum or rubber, as set forth, for the purpose specified.

2,091.—B. F. Moore, of Detroit, Mich., or an Improvement in Hydrants :

I claim the combination of the cap, B, with valve seat attached, bracket, f, nut, g, thimble, h, and band, i, for the purposes set forth.

2,092.—Charles O'Bryan and Henry Kreps, of Minerva, Ohio, for an Improvement in Plows :

We claim the combination of the beam, A, provided with the yoke, B, and the handles, C C, with shares, D, attached, and the braces, E E, arranged as and for the purpose set forth.

[This invention relates to an improvement in that class of plows which are used for the cultivation of growing crops, and are commonly termed "shovel plows." The object of the invention is to obtain a double plow of the kind specified, which will admit of having its shares readily adjusted to plow of a greater or less depth, and, at the same time, be exceedingly simple, strong and durable.]

2,093.—A. M. Olds, of Glenmont, Wis., for an Improved Bag Holder :

I claim the slide, C, placed on the hollow post, A, and provided with the sliding pieces, E E, and stationary board, e, rotary spurs, l and g, and pawl, J; the side pieces, E E, having arms, D D, attached, and a weight, I, and connected to a slide, G, by a cord, F, all arranged to operate as and for the purpose set forth.

[The object of this invention is to obtain an implement or device by which bags may be held in proper position, with their mouths or open ends distended for the purpose of being readily filled; the device at the same time admitting of being readily manipulated for the purpose of adjusting the bags to it and detaching them therefrom.]

2,094.—Nathaniel Parks, of Rome, N. Y., for an Improvement in Telegraphing :

I claim the system of operating non-insulated or imperfectly insulated cable or metallic conductors, by such arrangement or modification of the receiving instrument as will provide for the results indicated in the preceding specification.

2,095.—R. P. Parrott, of Cold Spring, N. Y., for an Improvement in Projectiles for Rifled Ordnance :

I claim the soft metal ring, B, cast in a groove, O, in the body of the projectile, and upon a taper portion, d, extending from the said groove to the base, and upon ribs or feathers, f f, or their equivalents, formed upon the body, and having its rear edge, i, exposed flush or thereabouts with the base of the body, all substantially as described.

2,096.—R. P. Parrott, of Cold Spring, for an Improvement in Projectiles for Rifled Ordnance :

I claim the formation of such wrought iron cup before the insertion of the projectile into the gun, with projections, a a, to enter into the rifle grooves, substantially as described.

2,097.—Robert Paton, New York City, for an Improved School Seat :

I claim a folding seat, D, attached by joints, d, to the side frames, A, which joints are at the back parts of supports, c, as shown, whereby the seat is supported directly underneath it and in front of the joints, d.

2,098.—Wm. P. Patton, of Harrisburgh, Pa., for an Improvement in Lamps :

I claim, first, The employment of the adjustable and movable chimney support, B, when it is constructed and arranged in the manner specified.

Second, The combination of the support, B, as constructed, with the air chamber, C, the two being arranged and used in the manner set forth.

Third, The construction and application of the petticoat, E, or its equivalent, substantially in the manner and for the purpose set forth and described.

2,099.—J. F. Pond, of Cleveland, Ohio, for an Improvement in Seed Planters :

I claim, first, The two serrated or plain disks, W W, oblique to the line of motion, upon stationary adjustable and reversible arms, a a, attached directly to the dropping tube, T, and the stationary and adjustable arms attached to a piece, P P, for the purpose of covering grain, cultivating and hoeing vegetables in different manners, as set forth.

Second, I claim the application of the cone bearings, B, and cap, d, and pin, i, in the hub, H, and disk, W, when placed or running obliquely to the line of motion, when applied to seed planters, cultivating and hoeing machines, for the purpose of equalizing the side draught to obviate friction and secure a more easy action of the machine or implement, as specified, for the purposes set forth.

2,100.—James Rahill, of Ramsgate, England, for an Improvement in Artificial Horizons for Quadrants :

I claim the arrangement and adaptation to instruments of the above

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description, of a pendulum having one or more horizontal bars or arms, and capable of adjustment with the true horizon and the center of the horizon glass and eye piece, such bars or arms forming an artificial horizon, which may be relied upon for taking observations when the true horizon is obscured.

2,101.—S. H. Russell, of Boston, Mass., for an Improved Canteen Filler:

I claim the described canteen filler, consisting of the tube, A, and short tube, C, with its partition, e, forming the passages, 3 and 4, substantially as specified.

2,102.—S. M. Sherman, of Fort Dodge, Iowa, for a Basket:

I claim the employment or use of the plates, C, applied to the outer sides of the staves, B, in connection with the rods or hoops, D E, one or more pairs, applied to the staves and secured thereto substantially as and for the purpose set forth.

2,103.—J. J. Smith, of Elizabeth, N. J., for an Improved Method of Operating Dampers in Steam Heating Apparatuses:

I claim governing the supply of cold air admitted to the steam heating surfaces by the temperature of the said steam heating surfaces, substantially in the manner and for the purposes described.

2,104.—L. M. Speer, of Belle Vernon, Pa., for an Improvement in Machines for Washing Sand:

I claim the combination of inclined screw elevators, B, and sluices, G, with the boxes, A, arranged and operating in the manner substantially as described, for the purpose of giving the sand a continuously undulating motion while subjected to the action of the current of water, as set forth.

2,105.—P. H. Standish, of Santa Clara, Cal., for an Improvement in Trashing Machines:

I claim the employment or use, in combination with a thrashing cylinder, B, of an adjustable drum formed of a series of toothed concaves attached to or connected with a common shaft, substantially as shown, to admit of any one of a series or number of toothed concaves having teeth of different thicknesses being used with the thrashing cylinder, as circumstances may require.

2,106.—R. S. Stubbs, of Claremont, N. H., for an Improved Apparatus for Working Ships' Boats:

I claim, first, The means specified for attaching or detaching the boat and fall, consisting of the blocking piece, 1, in combination with the rockshaft, 4, and rod, H, fitted and acting substantially as specified.

Second, I claim the double winch, M, formed with wavy or zigzag grooves, and arranged in the manner specified, to act upon the ropes or chains of the falls to the boat, as set forth.

Third, I claim the arrangement of the wheel, o, friction band, o', lever, L, pawl, L', and wheel, 11, to control the raising or lowering of the boat, in the manner set forth.

2,107.—Charles Teckelnburg, of Philadelphia, Pa., for an Improved Sugar Machine:

I claim providing the cylinder, A A and B B, with the saws, e e and g g, respectively, as described, the said cylinders being arranged to operate together in combination with the feed trough, C, substantially as described and for the purpose specified.

2,108.—Louis Tilliers, of New York City, for an Improved Motive Power:

I claim the use or employment of the levers, A, weighted levers, B, shaft, S S, in combination with the connections described, when the same shall be arranged and operated as described and for the purpose specified.

2,109.—Solomon and Nicholas Van Dyk, of St. Louis, Mo., for an Improved Coffee Roaster:

We claim the construction of a cylindrical coffee roaster with internal flues placed angularly to the center of the cylinder and with each other, substantially in the manner described and for the purpose specified.

2,110.—J. L. Vauclain, of Lafayette, Ind., for an Improvement in Locomotive Smoke Stacks:

I claim, first, The arrangement of a shifting throat, E, in combination with the exhaust steam and smoke passages, substantially as and for the purposes set forth.

Second, Providing the smoke passage of a locomotive with a screen, I, having apertures, K, closable by a register, L, under control of the engineer, as and for the purpose set forth.

2,111.—John Walch, of New York City, for an Improved Sink:

I claim the arrangement and combination with a sink, A, the channel, B, on the side and the channel, D, at the bottom of said sink, both channels communicating with each other and provided with a pipe or projection, E, at the extreme end of the channel, D, said channels, B and D, and pipe, E, being covered by a partly perforated and removable cover, G, constructed as described, and forming thereby a bottom and side escape for the water, as set forth.

2,112.—John Warner and J. H. Vosburgh, of Galesburgh, for an Improved Stump Machine:

I claim, first, The arrangement of the chains, I I, axles, E D, pulleys or drums, G F, chain, H, and cord, K, upon and in connection with the frame, A, as and for the purpose set forth.

Second, In combination with the subject of the first claim, we claim the employment of the vertical frame, L, when used as and for the purpose set forth.

2,113.—J. B. Waring, of South Manchester, Conn., for an Improvement in Machines for Sorting Thread:

I claim, first, Varying the inclination of a lever, C, by means of slight differences in tension due to variations in the size of a thread running between freely rotating wheels, D D', mounted on such lever, without a rubbing friction of the thread against either of such surfaces; and in combination therewith and by means of such changes so produced in the inclination of C increasing and diminishing the distance between the axes of D D', the whole operating together substantially as set forth, for the purpose of actuating mechanism which shall induce the shifting of the thread from one bobbin or receiver to another without subjecting the thread to any considerable strain.

Second, The construction and arrangement of continuously revolving thread griping wheels, D D', levers, C and E, joint, c, and surfaces, F G, for the purpose set forth.

Third, The adjustable cam, F, or its equivalent, arranged relatively to the lever, E, and surface, G, or their equivalents, substantially as described.

2,114.—George Whitford, of Providence, R. I., for an Improved Washboard:

I claim as a new article of manufacture a washboard (or rubber for washing machines) composed of vulcanized caoutchouc, gutta percha, or other gums, with bars and ribs, constructed and arranged substantially as described for the purposes specified.

2,115.—J. R. Whittemore, of Chicopee Falls., Mass., for Improvements in Straw Cutters:

I claim the compressible mouth of the hopper in combination with the hide roll, A, or its equivalent, and the cylinder of knives, B, substantially as and for the purpose specified.

2,116.—John Woody, of Mount Vernon, Ind., for an Improvement in Harvesters:

I claim the lever, k, attached to the draft pole, B, by the bar, l, and the bar, C, which supports the driver's seat, D, and is attached to the draft pole, B, by the link, p, in combination with the guide, u, attached to one side of the seat support, q, the perforated bar, v, attached to the support, g, and fitted in the guide, u, all being arranged as and for the purpose specified.

[This invention relates to improvements in part pertaining to the cutting device, whereby the same is rendered durable and effectually prevented from being choked or clogged, The invention also relates to an improvement for elevating and depressing the cutting device, and also to an improved divider at the grain end of the platform for separating the cut from the standing grain and guiding the former on the platform.]

2,117.—J. O. Blythe, of Germantown, Pa., assignor to himself and J. W. Jones, for an Improvement in Ventilating Hats and Caps:

I claim a ventilating or extension cap or hat formed by the combination and arrangement of the parts, a b d and E, substantially as described.

2,118.—H. F. Cox, of Jersey City, N. J., and Alex. Millar, of New York City, assignors to H. F. Cox, of Jersey City, N. J., for an Improvement in Machinery for Cutting Corks:

We claim so combining the fixed clamps with the spindles and cutters revolving around them that the latter can be both revolved and raised and lowered, without imparting motion to the clamps, substantially in the manner and for the purposes set forth.

We also claim the cutters so formed as to make, in the first instance, two annular and concentric incisions and then grub out the cord-wood left detached by said cutters, substantially in the manner set forth.

We also claim the arrangement, as described, of the adjustable levers and links, and their combination with the spindle frame and the driving cams, for the purpose of producing the different degrees of travel required of the spindle frame for cutting corks of the various lengths, and of enabling the said frame to be always started from a given point, as set forth.

2,119.—H. W. Evans (assignor to himself and C. C. Jenkins), of Philadelphia, Pa., for an Improvement in Equalizing the Action of Springs in Governors:

I claim combining a spring with the governor spindle, A, and rods, F and F', so arranged as to form a knee-joint, substantially as and for the purpose set forth.

2,120.—W. A. Maurin (assignor to Chase, Bros. & Co.), of Boston, Mass., for an Improved Camp Bedstead:

I claim, first, the piece, F, with its projections, x, in combination with the hasp, H, operating with the pawls, G, substantially as described, whereby the head and foot extensions are adjustable and fixed in any desirable position, and whereby those appliances fasten the legs.

Second, The folding legs, L L, in combination with the supporting brace, or spring, M, substantially as described, whereby the sagging of the middle of the bed is prevented.

Third, The folding and bent rods, I and J, substantially as described, whereby the frame, supporting the net-work or curtains may be folded in their application to bedsteads, substantially as described.

2,121.—E. H. Perry (assignor to Sackett, Davis & Co.), of Providence, R. I., for Machine for Making Split Rings:

I claim, first, The mode of operation substantially as specified, by means of which a wire of indefinite length is wound in successive coils of two or more convolutions, and each coil cut from the wire as fast as it is formed, as set forth.

Second, Also the mode of operation substantially as specified by means of which each coil is successively conveyed to the point where it is swaged into a ring and then conveyed to the point where it is discharged from the machine.

Third, Also in combination with the carrier, K, or its equivalent for transporting the coil, the employment of the punches, L and N, or their equivalents, substantially as described for the purposes specified.

Fourth, Also, in combination with a spindle or its equivalent, for winding the coils, the employment of a clamp or its equivalent, substantially as described, for holding the wire against the spindle while it is being wound in the manner and on the principle, substantially as set forth.

Fifth, also The mode of operation, substantially as described, by means of which the end of the wire after a coil has been cut off, is prevented from bearing against the winding spindle while it is discharging the coil, as set forth.

2,122.—Monroe Stannard, of New Britain, Conn., assignor to Pratt, Whitney & Co., of Hartford, Conn., for Improvement in Rotary Pumps:

I claim the employment of the passages, m, leading into the abutment chambers, substantially as and for the purpose specified.

I also claim the employment of adjustable gages to limit the distance to which the pistons may be protruded, substantially in the manner and for the purpose set forth.

EXTENSION.

5,253.—S. G. Cornell, of Greenwich, Conn., for Improvement in Lead Pipe Machinery. Patented August 21, 1847:

I claim placing the die for forming the exterior surface of the pipe in the piston, or the hollow mandrel, as the case may be, substantially as described, instead of placing it in the head of the lead cylinder, as has been heretofore done, so that, as the piston is forced into the cylinder, or the cylinder forced over the piston, the pipe will be formed at the point of pressure without moving the mass of lead relatively to the cylinder; and in combination therewith, I claim the color for forming the interior surface of the pipe; the die and core being adjusted and held in their proper relative positions by any of the known methods.

RECENT AMERICAN INVENTIONS.

Projectiles for Rifled Ordnance.—R. P. Parrott, of the West Point foundry, Cold Springs, N. Y., has two patents this week on projectiles. One invention consists in an improvement upon the elongated projectile, for which Letters Patent of the United States were issued on the 28th day of October, 1856, to John B. Read. That projectile had attached to its rear a wrought-iron cup, the edges of which were to be driven into the rifle grooves of the gun by the action of the explosion of the charge of powder; but it has been found by experiment, that when the edges of the said cups were made thin enough to insure their entrance into the grooves of the gun in such a manner as to prevent windage and obtain the rotary motion of the projectile, the cups became so weak as to be liable to break away from the body of the projectile, and were beside liable to injury in handling. In order to prevent this, Mr. P. makes the said cup, more especially at its edges, of greater thickness, and to insure its proper entrance into the grooves, Mr. P. swages or otherwise forms the said cup before the insertion of the projectile in the gun, in such manner that on loading it will enter into the grooves in such a way that it will not interfere with the free loading of the gun, but that it will be driven completely into the grooves, and caused to fit the grooves and lands by the force of the explosion of the charge of powder without any danger of its being broken. The other invention consists in an improved mode of fitting the rear portion of an elongated projectile for rifled ordnance, with a packing ring of brass or other sufficiently soft metal or alloy, to be upset and expanded laterally, and so driven into the grooves of the gun by the force developed by the explosion of the charge of powder.

Low-Water Detector.—This invention relates to that class of low-water detectors in which the valve of a steam whistle is opened by the expansion of a tube which is filled with water, when the water in the boiler is up to the desired level, and with steam when the water is below that level. It consists in an improved arrangement of steam and water circulation pipes in connection with each other, and with the said tube and the openings communicating with the boiler; also, in an improved arrangement of a steam pipe in combination with the said tube, the whistle, and the openings of communication with the boilers; and further, in a certain arrangement of levers for opening the valve of the whistle, in combination with the whistle, the expanding tube, and a fixed support. George W. Blake, of New York city, is the inventor of this device.

Press.—This invention relates to certain improvements on a press for which Letters Patent were granted to Samuel Hewitt, December 30, 1843. The press of Hewitt was provided with a "beater," so arranged and applied as to fill the press-box, or compact therein the substance to be pressed, thereby avoiding the necessity of an attendant to fill the box by the comparatively slow process of trampling. The beater of Hewitt's press was operated automatically but simultaneously with the descent of a follower, which was actuated by a single screw. This arrangement is attended with some disadvantages. Each fall of the beater on the loose substance, thrown in at the filling door, has to force the successive layers of hay, condensed or compacted by its previous action, until it overtakes the gradually descending follower; and then the whole mass, during the pressing operation, is pressed back again by the action of the follower, the bale being completed at the top of the box. This involves unnecessary surface friction, and in some degree arrests the condensing or compacting power of the beater itself. Experience has also detected another serious objection to the single screw applied to the center of the follower, and that is when one end of the bale is compacted a trifle harder than the other, a contingency of frequent occurrence. The follower inclines to tilt or bind in the press-box, causing great friction, and not unfrequently breaking the screw or the nut through which the screw works. The press of Hewitt was also cumbersome or could not be made portable. It required to be suspended in a large or high building with heavy timbers for its support, and with a pit or basement story for the team to work in. The object of the within described invention is to obviate these difficulties, and still retain all the advantages of the original press, or rather of the beater, which forms its distinctive feature, and to this end two screws are employed, and so arranged with the beater, that the latter may perform a double function; to wit, that of a beater and of a follower. John K. Harris, of Allenville, Ind., is the patentee of this invention.

Thrashing Machine.—The object of this invention is to obtain a grain-thrashing and separating machine, which will admit of being adjusted, so as to operate perfectly on different kinds of grain. The invention consists in having two or more rows or series of teeth of different thicknesses, placed on a polygonal drum which is adjustable, it being so arranged that any of the series or rows of teeth may be adjusted in a proper relative position with the thrashing cylinder, as circumstances may require. The inventor is P. H. Standish, of Santa Clara, Cal.

Folding Seat.—This invention relates to an improvement in that class of seats which are commonly termed "folding seats," and which are designed to offer as little obstruction as possible in the sweeping or cleansing of the room in which they are placed, as well as to facilitate the passing of persons between them in the congregating and breaking up of an audience or assemblage. The object of the invention is to obtain the results above alluded to with a less amount of stock than hitherto required for the seat, and at the same time have equally as comfortable a one, and firmer and more durable than those hitherto constructed. Robert Paton, 24 Grove street, this city, is the inventor.

Spoke Machine.—The object of this invention is to obtain a machine whereby spokes may be made with great rapidity, and in a perfect manner. The invention consists in the employment or use of a series of carriages placed in an inclined bed, and used in connection with suitable rotary cutters and pressure rollers, all arranged to effect the desired result. A. R. Davis, of Syracuse, N. Y., is the patentee of this invention.

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Notes & Queries

H. W., of N. Y.—A mixture of 2 parts of permanganate of potash and 3 of sulphuric acid forms a pasty mass which Professor Boettger says will give off ozone for several months. The permanganate of potash is prepared by fusing, in an iron crucible, 4 parts of hydrate of potash and 2 parts of chlorate of potash. When oxygen begins to be evolved, remove the crucible from the fire, and stir in slowly 1 part of peroxyd of manganese. Heat it up again until the mixture solidifies, after which boil it with 80 parts of water; then pass carbonic acid gas into it until it becomes red in color. The solution is now filtered through gun cotton, and evaporated to about one-half the original quantity. When cool, it crystallizes, forming the permanganate.

G. W. S., of Pa.—Mr. J. W. Cochrane, of this city, invented a bullet several years ago, which had spiral grooves in its interior, and which received a spinning motion in a smooth-bore musket by the force of the powder. You will find a description of this bullet on page 245, Vol. X. (old series), of the SCIENTIFIC AMERICAN.

F. W. S., of Pa.—D. Appleton & Co., of this city, are the publishers of Chapman's "American Rifle." We do not know where you can obtain a work on the drill of mounted lancers. The only reliable mode of obtaining information respecting the studies pursued at West Point is by letter addressed to the commandant of that military academy.

J. B. C., of Ill.—The substance which, by the addition of a drop of oil, will produce an explosion, is the quadrochloride of nitrogen, a heavy oily liquid.

T. H. C., of Mass.—We do not see how the rifling of a musket for half of its length would make it more easily kept clean. The plan would be objectionable.

J. U. K., of R. I.—There are a few colors printed on woolen yarn which stand the operation of fulling very well, but most of them being what are called "steam colors," are not suitable for the fulling operation.

J. W. T., of Ohio.—Your plan of propelling boats by sucking in a stream of water at the bow and driving it out at the stern has been repeatedly suggested. A boat might be thus propelled, but doubtless very slowly, as there would be a large expenditure of power in moving the water. This was Rumsey's old system of steamboat propulsion.

W. E. P., of Mass.—If you want an elaborate treatise on chemistry, you will find Cook's "Chemical Physics," by Professor Cook, of Harvard, a work of the very highest character. Professor Silliman's "Philosophy," published by H. C. Peck and Theo. Bliss, of Philadelphia, treats quite fully of light, heat, electricity, &c. If it is a small manual that you want, we recommend Wells's "Chemistry," published by Gould & Lincoln, Boston.

N. E. B., of N. H.—The attachment to a projectile of wings to mow down the enemy is a very old thing, and we don't see anything valuable in your application of them.

C. T. S., of New York.—You can obtain bars of aluminum at Ball, Black & Co., Broadway, and perhaps some castings of this metal. Aluminum corrodes slowly in some situations. It is a weak and light metal compared with iron. Hoe & Brothers, Gold street, manufacture hydraulic presses. We are not acquainted with the construction of Degan's flying machine.

P. G., of C. W.—You will observe in our last issue an answer to your inquiry, but we repeat it: The public exhibition of a machine prior to obtaining a patent does not invalidate your claims when the patent is issued.

N. P. B., of Ohio.—The milky way is formed of countless multitudes of stars, which appear separate from each other when viewed by the telescope. Our stellar system is shaped something like a flat wheel, and the milky way is the appearance that it presents when looked at edgeways.

D. S., of Maine.—Aluminum is now sold in England at 50s. (about $12 50) per pound.

D. C., of N. Y.—You propose to construct a perpetual motion, using the power of permanent magnets on a wheel to produce motion by alternately interposing a non-conductor between the magnet and the object attracted. You are not acquainted with the nature of the magnet. It exerts attractive power when glass and other non-conductors, so-called, are interposed between it and iron. The principle upon which your perpetual motion is based is therefore unscientific.

H. C. P., of N. Y.—The patent on the Howe Truss Bridge was extended for seven years from August 28, 1860. We do not know of whom you can get information regarding the purchase of a right. You might address Joseph Stone, administrator, Springfield, Mass.

O. S., of Md.—You will find very good articles on the manufacture of paper and starch in Dr. Ures's "Dictionary of the Arts."

G. H. R., of N. Y.—We do not know where you can obtain a good work on taxidermy.

J. G. P., of Pa.—Great war shields, carried on wheels, may be useful sometimes in storming forts, but they are entirely too cumbersome for field operations.

G. C. C., of Mo.—The Granite Railroad, at Quincy, Mass., was opened in 1827. It was constructed with a flat rail upon wooden sills. The Mauch Chunk Railroad, in Pennsylvania, was also opened in 1827, but later. The cars loaded with coal descended the inclined plane by gravitation, and were drawn back by mules. This was the second railroad constructed on the American continent. If we mistake not, Virginia claims to have built the first horse railroad in the United States, but we do not know the date of its opening.

New Books Received.

WESTMINSTER REVIEW.—We have received the last number of this publication from the republishers, Messrs. Leonard Scott and Co., No. 54 Gold street, New York. They call attention to the fact that new volumes of the four reviews and *Blackwood's Magazine* commenced in July. The terms are for *Blackwood* or either of the reviews, $3 per annum. For all four of the reviews and *Blackwood*, $10.

Money Received

At the Scientific American Office on account of Patent

Office business, during one week preceding Wednesday, Aug. 28, 1861:—

C. H. S., of N. Y., $15; H. & P., of Iowa, $25; W. P., of N. Y., $40; P. & L., of Mich., $15; P. D., of N. Y., $38; A. W., of England, $15; C. A. W., of Mass., $40; J. H. M., of Wis., $10; S. S., of Mass., $15; S. & S., of N. Y., $15; L. S. C., of N. Y., $15; C. L., of Ohio, $20; C. J. K., of N. Y., $20; E. H. L., of N. Y., $20; R. B., of Iowa, $20; H. D. M., of Mich., $30; C. C., of Ind., $45; E. D. W., of N. Y., $40; J. M., of N. Y., $40; C. H. D., of Vt., $20: J. W. S., of N. Y., $15; J. McL., of Ohio, $15; W. O. H., of England, $45; J. G. W., of N. Y., $25; M. L. B., of N. Y., $25; A. S. L., of N. Y., $20; A. H., of Minn., $25; J. M. C., of R. I., $15; C. W. S., of Maine, $15; W. T. G., of Ill., $15; I. P. T., of N. Y., $40; E. B., of Mich., $45; J. E. S., of N. Y., $20; P. F., of Pa., $20; K. H. C. P., of N. Y., $20; M. & K., of N. Y., $20; H. J. P., of N. Y., $15; T. G. M., of Pa., $10; P. F., of N. Y., $22; W. M., of N. Y., $15; D. B. A., of N. Y., $15; E. P. R., of N. Y., $80; W. H. G., of Pa., $25; R. G. H., of Mass., $25; B. & B., of Pa., $75; N. S. V., of Vt., $15; F. & M., of Iowa, $15; S. S., of Mass., $15; A. S. W., of N. Y., $20; W. F., of Ill., $20; I. J. C., of N. Y., $20; A. R., of N. J., $20; S. R. W., of Conn., $20; R. Q., of N. Y., $10.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Aug. 14, to Wednesday, Aug. 21, 1861:—

H. T. P., of Conn.; A. S. S., of N. Y.; C. J. K., of N. Y.; R. G. H., of Mass.; I. P. T., of N. Y.; H. and P., of Iowa; J. H. M., of Wis.; C. H. D., of Vt.; M. L. B., of N. Y.; W. H. G., of Pa.; J. P. F., of N. J.; B. and B., of Pa., three cases; J. M., of N. Y.; P. D., of N. Y.; A. H., of Minn.; M. O. B., of N. J.; R. Q., of N. Y.; E. D. W., of N. Y.

INSTRUCTIONS ABOUT EUROPEAN PATENTS, With a Synopsis of the Patent Laws of the Various Countries.

AMERICAN INVENTORS SHOULD BEAR IN MIND that, as a general rule, any invention which is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Four patents—American, English, French and Belgian—will secure an inventor exclusive monopoly to his discovery among 100,000,000 of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The majority of all patents taken out by Americans in foreign countries are obtained through the Scientific American Patent Agency. We have established agencies at all the principal European seats of government, and obtain patents in Great Britain, France, Belgium, Prussia, Austria, Spain, &c., with promptness and dispatch.

It is generally much better to apply for foreign patents simultaneously with the application here; or, if this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any one who first makes the application, and in this way many inventors are deprived of valid patents for their own inventions.

Many valuable inventions are yearly introduced into Europe from the United State, by parties ever on the alert to pick up whatever they can lay their hands upon which may seem useful.

Models are not required in any European country, but the utmost care and experience is necessary in the preparation of each case.

GREAT BRITAIN.

Patents for inventions under the new law, as amended by the act of Oct. 1, 1852, and now in operation, include the United Kingdom of Great Britain and Ireland in one grant, which confers the exclusive right to make, use, exercise or vend. This is conceded to the inventor, or the introducer, for a period of fourteen years, subject, after the patent is granted, and the first expenses paid, to a government tax twice during its existence—once within three years, and once again within seven. The purchaser of a patent would assume the payment of these taxes.

There is no provision in the English law requiring that a patented invention shall be introduced into public use within any specified limit. Under the Patent Act of October, 1852, the British government relinquished its right to grant patents for any of its colonies, each colony being permitted to regulate its own patent system. If a patent has been previously taken out in a foreign country, the British patent will expire with it.

FRANCE.

Patents in France are granted for a term of fifteen years, unless the invention has been previously secured by patent in some other country; in such case, it must take date with and expire with the previous patent. After the patent is issued, the French government requires the payment of a small tax each year so long as the patent is kept alive, and two years' time is given to put the invention patented into practice.

It should be borne in mind that, although the French law does not require that the applicant should make oath to his papers, yet if a patent should be obtained by any other person than the inventor, upon proof being adduced to this effect before the proper tribunal, the patent would be declared illegal.

BELGIUM.

Patents in Belgium are granted for twenty years, or if previously patented in another country, they expire with the date thereof. The working of the invention must take place within one year from date of patent; but an extension for an additional year may be obtained on application to the proper authorities. Inventors are only legally entitled to take out patents.

THE NETHERLANDS.

Patents are granted by the Royal Institute of the Netherlands to natives or foreigners represented by a resident subject, which extend to a period of about two years, within which time the invention must be brought into use, and upon payment of an additional tax, a patent will be granted to complete its whole term of fifteen years. Unless these conditions are complied with, the patent ceases.

PRUSSIA.

Applications for patents in Prussia are examined by the Royal Polytechnic Commission, and unless there is novelty in the invention, the applicant's petition will be denied; and if it is granted, the invention must be worked within six months afterward. A respite, however, of six additional months may be obtained, if good and sufficient reasons for it can be shown.

AUSTRIA

Austrian patents are granted for a term of fifteen years, upon the payment of 1,000 florins, or about $500 in American currency. This sum, however, is not all required to be paid in advance. It is usual to pay the tax for the first five years upon the deposit of the papers, and the patent must be worked within its first year. The Emperor can extend the patent and privilege of working by special grant. In order to obtain a patent in Austria, an authenticated copy of the original Letters Patent must be produced.

SPAIN.

The duration of a Spanish patent of importation is five years, and can be prolonged to ten years; and the invention is to be worked within one year and one day.

To obtain a Cuban patent requires a special application and an extra charge.

RUSSIA.

Since the close of the Crimean war, considerable attention has been given to Russian patents by Americans. Russia is a country rich in mineral and agricultural products, and there seems to be a field open for certain kinds of improvements. The present Emperor is very liberally disposed toward inventors, and as an evidence of the interest which he takes in the progress of mechanic arts, we may state that we have had visits from two distinguished Russian *serfs*, specially sent out by the Emperor to examine American inventions. As Russian patents are expensive, and somewhat difficult to obtain, we do not take it upon ourselves to advise applications; inventors must judge for themselves; and this remark applies not only to Russia, but also to all other foreign countries.

CANADA.

Patents of invention are granted only to actual residents of Canada and British subjects. Under the general Patent Law of Canada, an American cannot procure a patent for his invention there. The only way in which he can do so is by virtue of a special act of Parliament, which is very difficult, uncertain, and expensive to obtain. Several zealous friends of reform in Canada are working earnestly to bring about a reciprocal law, but their efforts have thus far proved fruitless.

BRITISH INDIA.

The date of the law, Feb. 28, 856; duration of a patent, fourteen years. Invention must be worked within two years from date of petition. Privilege granted only to the original inventor or his authorized agent in India.

SAXONY.

Duration of patent, from five to ten years. Invention must be worked within one year from date of grant. Careful examination made before granting a patent.

HANOVER.

Duration of patent, ten years; and in case of foreign patent having been previously obtained, an authenticated copy of said patent must be produced. Invention must be worked within six months from date of grant.

SARDINIA.

Duration of patent, from one to fifteen years. Patents for five years or less must be worked within one year, and all others within two years.

NORWAY AND SWEDEN.

Duration of patent, three years, at least; fifteen at most, according to the nature and importance of the invention. Patents for foreign inventions not to exceed the term granted abroad, and to be worked within one, two or four years.

AUSTRALIA.

Date of law, March 31, 1854. Careful examination made by competent persons previous to issue of patent, which, when granted, extends to fourteen years. Imported inventions are valid according to duration of foreign patent. It would require from twelve to eighteen months to procure a patent from the Australian government.

Parties holding foreign patents secured through our agency will be notified from time to time of the condition of their cases.

GENERAL REMARKS.

While it is true of most of the European countries herein specified, that the system of examination is not so rigid as that practised in this country, yet it is vastly important that inventors should have their papers prepared only by the most competent solicitors, in order that they may stand the test of a searching legal examination; as it is a common practice when a patentee finds a purchaser for his invention for the latter to cause such examination to be made before he will accept the title.

It is also very unsafe to entrust a useful invention to any other than a solicitor of known integrity and ability. Inventors should beware of speculators, whether in the guise of patent agents or patent brokers, as they cannot ordinarily be trusted with valuable inventions.

Messrs. MUNN & CO. have been established *fifteen years* as American and Foreign Patent Attorneys and publishers of the SCIENTIFIC AMERICAN, and during this time they have been entrusted with some of the most important inventions of the age; and it is a matter of pardonable pride in them to state that not a single case can be adduced in which they have ever betrayed the important trust committed to their care. Their agents in London, Paris, and other Continental cities, are among the oldest and most reliable Patent Solicitors in Europe, and they will have no connection with any other.

CAUTION.—It has become a somewhat common practice for agents located in England to send out circulars soliciting the patronage of American inventors. We caution the latter against heeding such applications, or they may otherwise fall into the hands of irresponsible parties, and thus be defrauded of their rights. It is much safer for inventors to entrust their cases to the care of a competent, reliable agent at home.

FEES.—The fees required by us for the preparation of foreign applications are not the same in every case; as, in some instances, when the inventions are of a complicated character, we are obliged to charge a higher fee. Applicants can always depend, however, upon our best terms, and can learn all particulars upon application, either in person or by letter.

Parties desiring to procure patents in Europe can correspond with the undersigned, and obtain all the necessary advice and information respecting the expenses of obtaining foreign patents.

All letters should be addressed o Messrs. MUNN & CO., No. 37 Park-row, New York.

CHANGE IN THE PATENT LAWS.

NEW ARRANGEMENTS—PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws, recently enacted by Congress, are now in full force, and promise to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than **FIFTEEN THOUSAND** Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors

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and Patentees, at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering estimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient co ps of Draughtsmen and Specification Writers than are employed at p esent in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

Testimonials.

The annexed letters, from the last three Commissioner of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.:—Gentleman: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

The Validity of Patents.

Persons who are about purchasing Patent property, or Patentees who are about erecting extensive works for manufacturing under their Patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing Patent, before making large investments. Written opinions on the validity of Patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited For rther particulars, address MUNN & CO., No. 37 Park-row, New York .

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as a measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Interferences.

We offer our services to examine witnesses in cases of interference, o prepare arguments, and appear before the Commissioner of Patents or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "*Hints to Inventors.*" Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed, for the Patent Office. These should be securely packed, the Inventor's name marked on them, and sent, with the government fee, y express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but tle risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Extension of Patents.

Va uable Patents are annually expiring which might be extended and bring fortunes to the households of many a poor Inventor or his family. We have had much experience in procuring the extension of Patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we have lost but *two* cases, and these were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to insure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with Patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased Patentee may apply for an extension. Parties should arrange for an application for an extension at least six months before the expiration of the Patent.

For further information as to terms and mode of procedure in obtaining an extension, address MUNN & CO., No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume. by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

BINDING.—We are prepared to bind volumes, in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express or delivered at the office, 40 cents.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application to this office. Address MUNN & CO.,

No. 37 Park-row, New York.

RATES OF ADVERTISING.

Thirty Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

INVENTORS' MODELS, PATTERNS, MACHINES AND Drawings of all kinds, made on contract and warranted, by
1* EMERSON GODDARD, 23 Elm street, N. Y.

IMPORTANT TO SHIPOWNERS.
SANDS'S PATENT SEAM-ROPED SAILS.—Sails made by this plan are cheaper, lighter and more durable than lap-made sails. In a suit of sails for a 1400-ton ship a saving is effected of just 1000 yards of canvas, and of about 1200 lbs. in weight. After thorough trial, they are fully approved of and recommended by Capt. Barker, of the ship *Aurora*; Capt. Cook, of the ship *Emerald*; Capt. Luce, of the ship *Reverne*; and Messrs. Howland & Frothingham, owners and agents of the Dramatic Line. Any information in regard to these sails may be obtained of Messrs. Howland & Frothingham, at 106 Wall street, New York. WILLIAM A. SANDS.
10 2*

MACHINISTS' TOOLS.—SECONDHAND PLANERS, Lathes, Drilling Machines, Punching Machines, Cranes, &c., in good order, for sale by CHAS. W. COPELAND,
10 4 No. 122 Broadway, New York.

ALCOTT'S CONCENTRIC LATHES—FOR BROOM Hoe and Rake Handles, Chair Rounds, &c.—Price, $25; and a other kinds of Wood-working Machinery, for sale by
3*1em S. C. HILLS, No. 12 Platt-street, New York.

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*** Cases may be seen at the Post Offices of Jersey City, Williamsburgh, Yorkville and Sing Sing. 10 tf

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Communications upon this subject may be addressed to the Secretary of the Society, or to either of the following persons as the Special Committee of the Society upon Flax Culture, &c.
James Y. Smith, Providence.
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His Excellency, William Sprague, Providence.
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A NEW MODE OF CONSTRUCTING CANNON.

BY J. C. BABCOCK, C. E., CHICAGO, ILL.

Notwithstanding the very satisfactory accomplishments of modern artillery, there yet remains a great opportunity for improvement in its efficiency. This branch of military science should receive a greater share of the attention of our scientific men, for if cannon are to be constructed doubly efficient to any now in use, we cannot, without imminent danger, shut our eyes to the fact.

Better field pieces are wanted, combining greater strength and lightness. Before any degree of perfection in both these requirements can be obtained, the following problem must be solved:—What method of construction will occasion the most equal distribution of the circumferential strain, throughout the mass of metal?

No known material is capable of receiving a tensile strain without stretching. Cannon are subjected to two indirect tensile strains, circumferential and longitudinal. Now it has long been known (but not generally understood) that increasing the thickness of metal in a gun does not increase its circumferential strength beyond a certain point. This fact is easily proved and explained by the following experiment:—If we make equi-distant concentric lines on the end of a hollow cylinder of soft brass, Fig. 1, and impart an equal circumferential strain by means of a circular wedge driven into the bore, Fig. 2, we can at once observe how much more the inside is stretched than the outside, or even the intermediate spaces. The spaces between the lines will be seen to vary in width in direct proportion to the amount of strain on each, showing that while the inside space is strained almost to breaking, the intermediate spaces are much less strained, and the outer scarcely any at all.

Fig. 1

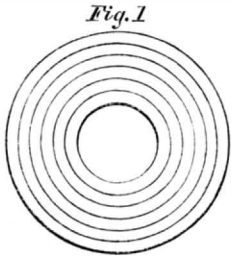
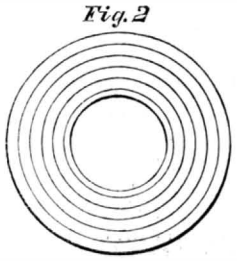
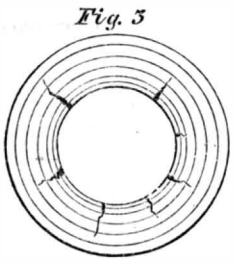


Fig. 2



Now if we increase the strain sufficiently to produce fracture, by driving the wedge still deeper, Fig. 3, it will be observed that the inner spaces will be completely severed, while the outer remains comparatively sound.

Fig. 3



The law has been found that in cylinders of metal, the circumferential strain on the different parts varies inversely as the squares of the distances of the parts from the axis. According to this ratio a two-inch gun with two inches of metal, will be internally fractured before the exterior receives one-twelfth part of the strain causing the fracture. Of course increasing the thickness still more would add very little to its strength.

The longitudinal strength has a direct bearing on the circumferential. The metal undergoing the opposite strains of compression and extension at the same time, is weakened in the former capacity in proportion to the strain in the latter, therefore increasing the longitudinal strength by adding thickness to the gun, increases its circumferential strength, but it is only to a certain degree.

Longitudinal strain being uniform does not affect our ratio of the circumferential strain. Ordinary guns have a longitudinal strength twelve times greater than their circumferential, while the strain in the latter direction is eight times as great as in the former.

I think no better disposition of a solid mass of metal will ever be made than in the scientific proportions of the Dahlgren guns; yet what a pity to have so much of the material comparatively idle.

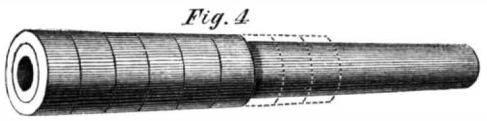
How then are we to equalize this immense circumferential strain which possesses the same ratio of inequality in all solid masses of metal?

A scientific arrangement of the material should be made whereby the several parts would take a moderate share of the strain, instead of the interior parts having too much and the exterior too little.

Numerous plans have been tried to accomplish the object, yet none have succeeded better than Armstrong or Whitworth. The wonderful accuracy and range of their guns is owing to the great velocity given to the shot which their method of construction alone renders possible. Their respective plans, although alike in principle, differ somewhat in execution. Their guns are built with concentric tubes or rings shrunk successively on each other with a gradual tension. The tension is increased from the interior to the exterior of the gun by a greater expansion in the heating of the different parts.

Another plan has been attempted to accomplish the same object by winding wire around a cylinder, increasing the tension each layer. Were there no longitudinal strain to contend against this plan would approach perfection; but it being necessary to braze the wire together in order to give the gun sufficient longitudinal strength, the heat required in the operation destroys the tension, rendering the gun at once inferior to one wrought in a solid mass.

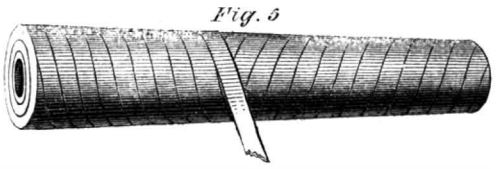
Fig. 4



As has been said before, the longitudinal strain weakens the circumferential strength; this is a fact pertaining to all cannon that have yet been constructed. The idea has occurred to me, that in such a predominance of the longitudinal strength compared with the strain, that such an arrangement of material might be made whereby the longitudinal strain would assist, instead of weakening the circumferential strength. My plan for accomplishing so seeming an impossibility is as follows:—

On a cylinder of cast iron (the best material for the inside of a cannon) shrink a layer of wrought iron rings with moderate tension; these, with the cylinder should form about one-half of the thickness of the gun, Fig. 4. Bands of steel should now be wound spirally in alternate layers to the required thickness, reversing the winding each layer, Fig. 5. These bands should be wound while heated directly from a furnace prepared for the purpose, and the tension increased on each layer in proportion to its distance from the bore, by regulating the heat.

Fig. 5



I am inclined to believe that this method of construction will make a stronger gun than has yet been produced. The longitudinal strain on the spiral windings, increases the tension at the moment of discharge when and where it is most needed, for no spiral can be extended longitudinally without diminishing in diameter. The arrangement of the materials in the order of their expansive properties, gives more work to the exterior of the gun, for cast iron is doubly more expansive than wrought iron, and wrought iron even doubly more expansive than steel.

The proper proportionment of the different materials in such a construction can only be obtained by experiment; when found, a gun must be made of immense strength and comparatively light.

An increase of strength in a cannon is an increase of its power and efficiency as an engine of war, especially when lightness is also combined. Modern ingenuity is advancing the perfection of the powder, bore and projectiles far more rapidly than the gun itself will permit of, and when cannon are made stronger and more scientifically, it will be time to turn our attention to the minor considerations of projectiles and breech-loading.

An Article Resembling Honey.

A patent has lately been taken out by Charles Stevens, of London, for manufacturing a peculiar article for domestic use, which is stated to resemble honey, and is described as follows in *Newton's Journal of Arts:*

To two hundred and fifty parts of water, a hundred parts of the fecula of potato (or fecula procured from other vegetables) is added, and in this, or its equivalent in sprouted and malted barley, diastase, to the amount of 1-2000 of the above quantity of fecula, is well mixed. The composition is then exposed to heat, which is gradually increased from 70° to 75° Reaumur, to obtain saccharization.

In order to act with greater celerity, and also with more precision as to the saccharization, instead of having but one operation, as above described, the mixture is divided into two equal parts, each of which undergoes heating, but the saccharization of one is made more complete than the other. The two are then united, and the whole is subjected to evaporation till it has acquired the consistency of honey, and is bleached by animal charcoal, albumine, or other similar and suitable means.

Thick sirup of fecula obtained by acids, perfectly neutralized, may be substituted for the first liquid, in which, while boiling, a small quantity of polenta of potatoes is mixed. This is kept stirred till cool, and to it is added 3-20 of the entire quantity of honey or honey-comb, and a little thyme or other perfume, to suit the taste.

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